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ABSTRACT

Papers presented at this symposium are grouped into eight sections, including introductory overviews; the delivery of health care, education, and community services; contributions from the field of scientific and technical information; teleconferencing and computer conferencing services; new services; and communication processes at both the individual and the organizational levels. Each of these sections lists the papers presented, provides a brief summary of their contents, and summarizes points arising in their discussion. A final section provides slightly edited transcripts of the comments by four participants at the end of the symposium on the issues of policy and methodology which had been raised during the four days. Appendices list the names and addresses of the participants in the meeting, provide some results from an evaluation questionnaire distributed on the last day, outline the notes made on one of the sessions conducted as an audioconference with two speakers based in North America, and also provide a brief response by Herb Ohlman (World Health Organization) to a draft of discussion summaries. (Author/JEG)

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NATO Symposium on the Evaluation and Planning of Interpersonal Telecommunications Systems

FINAL REPORT ON
NATIONAL SCIENCE FOUNDATION
GRANT NO. APR77-20480

M. C. J. Elton
Alternate Media Center
New York University
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INTRODUCTION

In September 1977 the first international symposium devoted to research on the evaluation and planning of new person-to-person telecommunication systems took place at the University of Bergamo in north Italy. It was sponsored by NATO's Special Programme Panel on Systems Science.

The National Science Foundation provided a grant towards the travel costs of some U.S. participants and for the purpose of making summarized information from the symposium available to U.S. researchers. As anticipated the meeting has provoked a good number requests for information. It has been possible to meet some on an ad hoc basis; others are met by this report.

The main sections of the report list the papers presented, provide brief summaries of their contents, and summarize points arising in their discussion*. A final section provides lightly edited transcripts of the contributions of four participants who commented at the end of the Symposium on the issues of policy and methodology which had been raised during the four days.

There are four appendices. One lists the names and addresses of the participants in the meeting. A second provides some results from an evaluation questionnaire distributed on the last day. A third contains the notes made on one of the sessions conducted as an audioconference with two speakers based in North America. These notes were kindly provided by Bob Johansen (Institute for the Future), who was present at Bergamo, and John Carey (Alternate Media Center), who "attended" from New York.

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*Three options are available to those who require a copy of one of the papers: (1) Write to its author (whose address may be found in Appendix A. (2) Write to the author of this report who will make copies of individual papers available as long as stocks last. (About half the papers are out of stock.) (3) Await publication of the proceedings of the symposium. They will be published around April 1978 by the Plenum Publishing Company, New York, under the title Evaluating New Telecommunication Services, Elton, M.C.J., W. A. Lucas and D. W. Conrath (eds.).

The final appendix comprises an amplification of his statements in discussion, which Herb Ohlman (World Health Organization) kindly sent us in response to a draft of the discussion summaries.

The members of the organizing committee for the symposium were David Conrath (University of Waterloo, Ontario, and Institut d'Administration des Enterprises, Aix-en-Provence), Dieter Kimbel (OECD, Paris), William Lucas (Rand Corporation, Washington D.C.) and Michael Tyler (Communications Studies & Planning, London). This report draws very heavily on the work of Dr. Lucas, especially in checking and editing the discussion summaries. It is also a pleasure to acknowledge the most important contribution of Barbara Lucas and Hilary Thomas as rapporteurs.

* * * * *

Background to the Symposium

Telecommunication systems which provide for communication between people, rather than computers or other instruments, are of two kinds. There are mass communication systems (broadcast radio and television) and interpersonal systems (for example, the telephone and Telex) which join together individuals or small groups. Here we have included in the interpersonal category certain systems for retrieving information from computers, essentially those systems in which the role of the computer is primarily to act as a store and to identify that information which best fits a user's request. (This excludes management information systems in which the computer performs important transformation functions.)

Distinctions between interpersonal and mass communication systems, and between these two and data communication systems, are increasingly breaking down for those who provide the services. (In the U.K. broadcasters are piloting information retrieval services and the British Post Office is competing with a more sophisticated system which could also be used for the exchange of messages. Elsewhere computer data networks are increasingly employed for the exchange of personal messages. And in the United States there are various experiments in the use of cable television systems for interpersonal communication.) Nevertheless, the distinctions remain meaningful in terms of the different uses to which the systems are put. And it is a common characteristic of all current research in our field that it is explicitly concerned with use.

In the laboratory and in the field there are a variety of new telecommunication services. They range from simple extensions to the basic capability of the telephone - allowing it to serve more

than two locations and more than one person per location - to picture telephones and two-way color television systems using satellites or lasers to connect health-care establishments.

They are seen as making possible new solutions to problems of major social concern. Applications of the technology, which are addressed in this volume, include: reducing the burden of business travel; dispersal of office work from city centers to the suburbs, smaller towns, rural areas, and "neighborhood work centers"; provision of health care, personal social services, and educational opportunities to those who are relatively underserved by reason of physical handicap or geographical location; public participation in local government; and improved coordination between the parts of large organizations.

While promising help in alleviating some problems, the new technology threatens to exacerbate others. There is, for example, concern about the dangers of dehumanization, invasion of privacy, and information overload. There is the risk of unintended side effects: maybe the reinforcement of undesirable trends in the balance between centralization and decentralization, or the possibility of increasing energy consumption by encouraging more dispersed working and living patterns. Then there are the perplexing problems of regulation and the development of policy at national and international levels. These grow ever more complicated as the computer industry increasingly penetrates the telecommunications industry, and as these two penetrate the economically fragile postal services.

Nor is it easy to predict whether, in a particular context, people will actually use some new telecommunication service. Confravision, a European public studio videoconferencing service, has fallen far short of its market targets; picture telephones have not lived up to their early expectations; and many early uses of telecommunications for the delivery of health care have been disappointing.

Considering all that it is scarcely surprising that, once started, research on the use and usefulness of new interpersonal telecommunications systems has grown rapidly. It is, however, somewhat surprising that (outside the military arena) it came into being only about seven years ago. One might have expected that at an earlier stage it would have provided a modest complement to the enormous efforts of technological development which have made the new systems possible.

Today's worldwide telephone system is a remarkable triumph of systems engineering. The systems science research which new telecommunication services require is not, however, a simple

extension of that which guided the development of the telephone system. Uncertainties regarding individual and organizational users are far harder to treat. No longer can one consider only service time characteristics (how long calls last), or the ergonomic design of the telephone instrument, or the necessary acoustical standards, according to the problem at hand. And the concept of marketing has become relevant, as it used not to be for the provision of telephone service by statutorily protected monopolies.

There are the communication problems one would expect of a young and fast growing area of interdisciplinary endeavor. How best can new entrants, especially from countries not previously involved, make connections to past research and to practitioners with like concerns? What are the methods for weeding out the false starts encouraged by demands for "quick fixes"? Where are the forums for the exchange of ideas and the challenge of one's peers? Are research conclusions reaching and being understood by those they are intended to influence? Do the latter consider researchers to be in touch with reality?

The symposium was designed to address such problems: to enable researchers, together with some business managers and adminstrators, to learn from one another. In soliciting and selecting papers the organizers encouraged authors to present research on which comment would still be useful to them; many of the papers describe work in progress. We also encouraged contributions which would be helpful to newcomers to the field; several of the papers contain useful reviews. We did not restrict ourselves to papers which portrayed systems scientists' wares, but included thoughtful discussions of aspects of the environments in which they must operate. We emphasized the need for papers to communicate successfully across cultural and disciplinary frontiers; most of the authors met this challenge without, we believe, trivializing their work.

For presentation here papers are grouped into eight sections. The first of these provides some introductory overviews. Next come two sections which deal with the delivery of health care, education and community services. The fourth section comprises contributions from the field of scientific and technical information (STI). This is followed by a group of papers concerned with teleconferencing and computer conferencing services; some report upon trials of new services and others look more deeply into communication processes at the level of individuals and of organizations.

While almost all the papers deal with new services, four approach particular services in such a way that they do not fall naturally into any of the preceding sections. They provide the

sixth section, entitled New Services. Three of the papers in the seventh section view developments in the field of telecommunications from different perspectives regarding society's use of information technology. The fourth paper in this section considers developments in the field of electronic funds transfer (EFT). Finally comes a group of papers concerned with aspects of planning and design. The last of these is concerned with planning one aspect of a field trial; the others address much more wide-ranging concerns.

Some changes have been made in the way papers were ordered and grouped at the symposium so as to make for easier reading here. The changes have been made in such a way that it remains meaningful to include in each of the sections below a summary of points raised in the corresponding discussion sessions at the symposium.

SECTION ONE

OVERVIEW OF RESEARCH ISSUES

User Research and Demand Research: What's the Use?
Michael Tyler

Technology and Structures - Man and Machine
Robert Chapuis

The Role of Telecommunications Policy Analysis in Service Planning
Lawrence H. Day

Communications - The Need for Research
J. B. Cowie

Section One

AN OVERVIEW OF RESEARCH ISSUES

Michael Tyler was asked to provide a paper drawing upon the critical review of methods of forecasting demand for new telecommunications services, which he and his colleagues recently completed for the British Post Office. His paper is concerned with methodology, primarily with questions of how to achieve results which are reliable and will provide useful input to those responsible for the introduction of new services. It aims to provide criteria which will be useful in assessing some of the papers in following chapters.

The paper by Robert Chapuis takes the form of the speech which he offered in the opening session. His attention is turned inward upon the enormous organizations responsible for providing telecommunications services in European countries ("whales swimming merrily....practically unnoticed.....sending up a little water spout to indicate their presence at a few infrequent public relations events" or "dinosaurs" with skeletons "too ossified to enable them to adapt to the changing environment"?). One of his main concerns is to introduce their endoeconomics as a rewarding subject for research. The other is to draw attention to their need to adapt to rapidly changing conditions.

In the light of recent developments in Britain, France, Germany and Sweden this is a particularly timely paper.

Two other papers are included in this chapter although they were presented later in the Symposium. Their authors come from the two telecommunications agencies which have, we estimate, undertaken and published, from very different perspectives, appreciably more policy-relevant research than their counterparts in other NATO countries: Bell Canada and the British Post Office. (The papers are, of course, written in an individual, rather than a corporate capacity.)

Larry Day examines the role of "telecommunications policy analysis" in the planning and development of new services. As context he describes the service planning process. By way of illustration his paper presents a case study of the technology assessment of the substitution of telecommunication for travel. It concludes with hypotheses as to the current "rules of the game" in the development of national telecommunications policy, and looks ahead, perhaps somewhat optimistically, to the day when large groups of users go ahead in using new capabilities as they see fit, regardless of the restrictions of policy.

From a European perspective, Jim Cowie's paper describes current policy issues in the development of new services, together with the actual and potential roles of the different actors in the process. Like Day, he draws attention to the rapidly increasing points of intersection between computers and telecommunications.

No technical knowledge of telecommunications is required to follow any of the four papers. While an interest in and some understanding of methodologies of applied research are assumed in Tyler's paper, none of the other contributions make even these demands.

DISCUSSION OF PAPERS BY CHAPUIS, COWIE AND DAY

Discussant and moderator: Dieter Kimbel

Kimbel opened the discussion saying he hoped it would serve to bring together the divergent views on regulation presented in each of the papers.

Chapuis then began by discussing the difficulties of comparing research questions and results on policy questions when the policies considered are so diverse. He suggested the need for a multi-disciplinary study which addresses and compares the motivational factors behind internal regulatory structures of different countries. Such a study is needed, he said, to draw together the common threads of interest in regulatory policy for telecommunications. Chapuis then spoke of some of the problems resulting from the absence of a telecommunications policy in Europe which transcends national boundaries. He suggested that the structure of the international network is currently depending more on accountants' national views than on an internationally defined policy.

Mandelbaum suggested that even if there were no national boundaries, the distribution and centralization of telecommunications systems would not look much different than they do today because decisions tend to be based primarily on economic considerations.

A general discussion followed on regulation and the entreprenuer. Goldstein differed with these portrayals of the development of telecommunications services and again pointed out the discussion was neglecting the role of the entrepreneur in executing policies and delivering actual systems. Decision on telecommunications, he said, result from choices by either the private or public sector--decisions which are not necessarily based on abstract need. He suggested that differences in systems lie more in the different nature of the decisionmakers than in an abstract conception of policy. Cowie suggested that policy researchers need a better understanding of which aspects of entrepreneurial activities and objectives could produce communications difficulties which are not in the national interest, for example, interconnect problems, and which aspects could produce benefits. Wells mentioned a dual role for the entrepreneur--to provide facilities and to use these facilities to provide services. What's lacking, according to Wells, is research on the effects of new services on people. People are more vulnerable than organizations and policy research must look to the effects of policy on minority interests. While not necessarily objecting

to this view, Goldstein pointed out that we need to recognize when regulation contributes more problems than it solves. Regulatory effects, he said, need to be weighed so that the problems caused by regulations don't outweigh the benefits.

Baudazzi suggested that the discussion tended to overemphasize the importance of people's interest research. Research, cannot deal with all problems. While it may be impossible for a citizen to recognize what's better between two choices, once the user learns something is better through experience, he doesn't need research. In his opinion, the different views of regulation among entrepreneurs or between entrepreneurs and government is merely a difference of opinion which is perhaps based on economic matters, but is not something which can be resolved by research.

Moss asked how can research be designed to address the user-generated telecommunications developments which emerge outside of the regulatory environment? Day responded that in discussing research, one is talking about a variety of problems and a variety of research methods. Just because research may not have an impact, he said, doesn't mean we shouldn't try. He went on to suggest that perhaps researchers should try to understand things besides the newest technologies. There should be more concern with the technologies--new or old--which are widely used, e.g., pocket computers and their impact.

Cowie referred back to Goldstein's remarks on the potential problems which may be caused by regulations. He said that regulations are accepted when they are seen to have a purpose which is beneficial to society, for example, speed limits. There will always be those who ignore the regulations and they must expect to be penalized if found out. In special circumstances, regulations may be strengthened, such as in an oil crisis. Society expects that the temporary or longer standing regulations will be adjusted when there is a consensus that they are no longer operating in the best interests of society overall.

With respect to entrepreneurial freedom, one speaker asked the group to consider as a specific example the problems which arise when a leased circuit is set up between, say, New York and Paris, and when the organization leasing the circuit uses it to pass information to the remainder of other European countries.

Day returned the discussion to the problem posed by citizen disregard of regulations and said that when telecommunications regulations are broken, nothing can be done about it. In his opinion, regulations exist to protect certain vested interests. Users will adapt technology to their own purposes and there is nothing regulators or entrepreneurs can do about this. He also

suggested that unanticipated developments can have a major impact. EFT evolved for one reason, but it may evolve further for another set of reasons.

Goldstein pointed out that his earlier remarks on entrepreneurs has been misunderstood. Policy research has ignored not the right of the entrepreneur but his role. It has ignored the decision of the entrepreneur to do or not to do something and now he does it. He felt that the papers presented by Chapuis, Cowie, and Day ignored this area. He also commented that much of policy research is not useful because it has concentrated on the past--not what is likely to occur in the future. Day suggested that one reason the entrepreneurs role may be ignored is that it is the funders who decide which questions will be researched, and the entrepreneurs don't fund research.

This led to a question to Cowie on the types of policy research activities in Britain. Cowie responded that there was recognition in Britain as elsewhere that the convergence of various fields involved in information processing and transfer generated policy issues which needed to be studied. Some issues had global implications, others were more localized to individual countries. It would benefit researchers if views and information could be exchanged as far as possible but it had to be recognized that this is a sensitive area.

Elton remarked that while policy research should help formulate better policy, there's a lag time between research and decisions. He stressed that unless the research results are exposed to a broad number of people, one must be cautious about relying on them.

The discussion again turned to the function of policy research and the factors it should consider, particularly the entrepreneur's role. Cowie remarked that independent research groups might provide government with more objective analysis of important issues and suggest policies which are in the best interests of the nation. Jull suggested that policy research could be viewed as a "chess game," to complement the "poker game" between the government and entrepreneur.

Next the discussion truned to the differences stressed by Yerrell between policy research (or research into policy) and policy-oriented research. Someone suggested that what's lacking is research on policy, and expressed the opinion that this should (a) be done outside the government and (b) take into consideration the views of all sectors.

Lucas pointed out that in his organization, successes often come from conceptualizing the problem in different terms than can be done

by the government organization charged with making policy. His organization's contribution to policy is often reconceptualizing the problem. He went on to say that stability in funding and a close affiliation with a government agency is very helpful in making policy research both relevant and useful. Cowie agreed with Lucas' remarks and suggested that since the major payoff of policy research is often embedded in the conceptualization at the beginning of the studies, research groups should spend more time than at present on conceptualization and less time on lengthy implementations. Lucas pointed out that in order to provide this conceptual work researchers need the remainder of the project time to replenish their store of intellectual investment.

SECTION TWO

PUBLIC SERVICES: HEALTH CARE

The "Patient Trajectory": A Modeling Tool for Planning and Evaluating Rural Telemedicine Systems
Maxine L. Rockoff

Telehealth Care in Canada
Anna Casey-Stahmer

A Methodology for Design of Advanced Technology-based Health Care Systems in Developing Countries
Unver Cinar

Section Two

PUBLIC SERVICES: THE DELIVERY OF HEALTH CARE

"Telemedicine" or "telehealth care" (the jargon is still at a formative stage) has become a significant field of research for North America and Japan; it is becoming one for certain developing countries. Though it is beginning to receive some attention in Italy and Sweden, by and large it has been of relatively little concern in the more industrialized European countries. Appropriately then we have papers from the USA, Canada and Turkey.

Maxine Rockoff has been responsible for managing the US Department of Health, Education and Welfare's very substantial program of research in telemedicine. Her paper, written in collaboration with Art Bennett of the Mitre Corporation, presents a general model for assessing the performance of different "manpower-technology combinations" for providing health care to isolated rural communities. They describe briefly the criteria that such a model must meet and some of the difficulties arising in meeting them. The model, based on the concepts of decision points and probabilities of transition from one node in the health care system to another, is illustrated using hypothetical data.

The model has been used as the foundation for a computer simulation of the flow of patients through a primary health care facility. The authors describe this process and the results obtained. The latter suggest that priority should be given to the use of narrow-band technology (i.e., systems which, unlike interactive television, are modest in the capacity they require for transmission). Finally they discuss the limitations of the methodology described.

Anna Casey-Stahmer's paper is quite different. After providing some background information regarding the Canadian context, she describes three recent experiments which made use of the Hermes satellite. Their approach to evaluation and, where possible, their preliminary results are summarized. The last quarter of the paper is devoted to a discussion of coordination between telecommunications and social service agencies, and of other issues arising in the evolution from research and development to operational systems.

The objective of the final paper is to propose a framework for the design and assessment of telemedicine systems for developing countries. Unver Cinar draws attention to distinctive features of the latter: their demographics, transport and telecommunications infrastructure, and distribution of existing health care resources. These are illustrated with a description of the present situation in Turkey. An outline design is then presented for the organization of a Turkish telehealth system and some preliminary consideration is given to its component telecommunications systems.

The three papers demand no prior knowledge of the technology, nor of particular analytical methods. Familiarity with basic OR techniques will, however, make it considerably easier to follow and reach a position on Rockoff's and Bennett's paper.

DISCUSSION OF PAPERS BY CASEY-STAHMER, CINAR AND ROCKOFF

Discussant and moderator: David Conrath

The discussion focused primarily on some critical questions which underly telemedicine designs.

1. Interdependence of the Telemedicine System and Organizational Structure

One of the first questions raised was: What is the interface between telemedicine and organizational structure for health care? Several speakers including Cinar and Rockoff focused on the idea that telemedicine cannot be considered in isolation from the organizational framework in which health care is delivered. In this regard, Conrath pointed out that, while the examples presented in the papers involved sophisticated technology, designers of health care systems cannot assume that technology is the answer. Cinar expanded this point, indicating that the technology should not only be considered in terms of other components of health care delivery (e.g., training, marketing, etc.) but also in terms of the entire spectrum of social and economic resources outside health care. Social variables and transportation networks are especially important factors which must be weighed. Another point raised with respect to organizational structure is that telemedicine can have a centralizing or decentralizing bias and planners must be aware of the potential for changing the locus of decisions in an organization when a telecommunications system is introduced.

Rockoff indicated that her presentation focused on whether one could substitute people (for example, nurse practicioners) with lower skills utilizing high technology for people with higher skills (for example, doctors) and low technology. In his commentary, Conrath suggested one might also consider creating new forms of organizations in order to use both *low* skills and *low* technology. Cinar noted that systems designers have often tried to impose technology on existing health care organizations rather than seek to adapt the organization and the technology to each other. In response to a statement that developed nations which have developmental and operational experience in telemedicine should provide assistance to developing countries, Cinar said that technology transfer across national boundaries has its own special problems. These include problems associated with utilizing foreign personnel unfamiliar with local conditions, short duration of assignment,

lack of participation in phases of implementation and lack of organizational continuity.

2. Impacts of the Project Experience

A second line of discussion focused on the impacts of the project experience. Casey-Stahmer had suggested in her presentation that a positive impact of the satellite communications experiments in Canada was increased interagency dialogue on health care delivery. Conrath, on the other hand, expressed concern that increased high-level interest could also be detrimental given the propensity of policy makers to base decisions on one or two experiences. Perhaps, Conrath suggested, experimental results should maintain a low profile so that conclusions on policy won't be made on one or two visible demonstration projects which may or may not be representative. In response, Casey-Stahmer noted that alternatives to highly visible demonstration projects may not be available and that in fact such experiments are useful because they catch the attention of policy makers. Project details are still usually left for analysis and recommendation by staff. It is important, however, that the staff keep level-headed in their analysis and in their recommendation to the policy makers.

A second point regarding the impact of demonstration projects was voiced by several participants who expressed concern that these projects may raise false expectations about health care in the sample population. Ohlman pointed to the Satellite Instructional Television Experiment in India. It was clear from the beginning that NASA would only provide its advanced communications satellite, ATS-6, for a period of one year. The experiment certainly stimulated, informed, and educated thousands of villagers during this period, but it was a let-down when they confronted the blank television screens the day after the satellite was pulled away. Casey-Stahmer noted that false expectations did not appear to be a problem in the projects she had studied. The areas of Canada in which telehealth care is being explored are the northern parts, where health care is generally a governmental program (i.e., with salaried staff, etc.), and it is the government which pays the operational costs. It is really the government (or its employees providing the health services) who are the *users*.

Conrath mentioned that the funding group can help meet the problem of raised expectations by paying operational costs of the technology so the users can continue the services if they desire. Some participants indicated, however, that even with continued availability of the technology, demonstration projects seldom continue after the initial demonstration period has ended.

SECTION THREE

PUBLIC SERVICES: EDUCATION AND COMMUNITY

Educational Experiments with the Communications Technology Satellite: A Memo from Evaluators to Planners
J. S. Daniel, M.L. Cote, M. Richmond

Evaluations of Interactive Tele-education in the Public Service Commission
Nicole Mendenhall and Rene Lortie

Open Choice - New Communication Systems and Applications at the British Open University
Peter Zorkoczy

Serial Experimentation for the Management and Evaluation of Communication Systems
William A. Lucas and Suzanne S. Quick

The Development of Two-way Cable Television: Applications for the Community
Mitchell L. Moss

Beyond Statistics
Red Burns

Section Three

PUBLIC SERVICES: EDUCATION AND COMMUNITY

A diverse set of educational experiments has recently been undertaken in Canada using the Communications Technology Satellite. Individual experimenters are responsible for evaluating their own projects; in addition an overall assessment is being made by John Daniel and his colleagues. The latter is concerning itself with the wider problem of institutional assimilation of new technology, as well as issues of educational effectiveness. The overall assessment was designed prior to the implementation of the experiments; hence a series of instruments were developed for the individual projects to draw upon.

Their paper describes the experiments. It also presents some observations and practical interim conclusions arising in the evaluation process, (this was still at an early stage at the time of writing).

The second paper is also concerned with Canadian research in the educational field, in this case the Public Service Commission's professional training for civil servants. Nicole Mendenhall and Rene Lortie present the results of field and laboratory studies used to investigate the applicability of videoconferencing to educational and administrative functions. They go on to propose a teaching/learning model for adult tele-education and to describe its testing in a laboratory simulation.

Peter Zorkoczy describes the needs for communication which arise within the context of the British Open University. He than describes current activities directed towards meeting them with the use of interactive telecommunication systems: e.g., audio-conferencing for tutorials, computer-based systems and an electronic blackboard which shares the telephone line used for speech. The Open University is developing some of its own low-cost technology.

The last three papers derive from the US National Science Foundation's research program concerning the two-way potential of urban cable television systems for the delivery of public services. On of three experiments conducted by the Rand Corporation in Spartanburg, South Carolina investigated the use of a simple terminal to allow students, being taught by television in their homes, to signal back to the teacher. After outlining the experiment, Bill Lucas and Suzanne Quick describe an instrument they developed to provide process information on the instructional dynamics in the cable and conventional (control group) classes. The instrument was designed to focus upon the distribution of classroom activities and upon the frequency of classroom interactions.

The authors also report how results provided by use of the instrument were fed back to instructors; statistics are provided which compare activity and interaction in earlier and later classes (i.e., before and after the information was fed back).

Mitchell Moss describes the experiment conducted by New York University in Reading, Pennsylvania. The cable television system there was used to provide interactive television connection between three Neighbourhood Communication Centers for older citizens and, on some occasions, a fourth mobile unit. Initially the proceedings ("programs") were carried live to a further 125 or so senior citizens in their homes; subsequently they were made available to all cable subscribers. He points out that the value of the system turned out to lie more in community communications than, as had been expected, in the delivery of public services. He notes that the system is now allowing users to play an important part in overcoming problems of inadequate coordination of services. Some interim conclusions are presented concerning the use and impact of the system.

The paper by Red Burns was presented in a session on methods of evaluation and implementation. It is now placed here since it too deals with the Reading experiment. Her concern is to show how a process was set up by which an emerging community could involve itself in the design and implementation of its own communication system. The paper deals with variables such as trust, comfort simplicity, and flexibility. Some conclusions are drawn about the nature of the interactive television medium and the process of implementing community-based telecommunications projects.

All the papers in this section are easily accessible, both in describing how interactive telecommunications may be used for educational purposes and in the community, and in raising a variety of issues of more general theoretical and procedural importance.

DISCUSSION OF PAPERS BY DANIEL, MENDENHALL, ZORKOCZY, LUCAS AND MOSS

Discussant and moderator: Percy Tannenbaum

The Chairman opened the discussion with comments upon the importance of non-verbal influences upon learning. He then posed two questions:

1. Which public are we serving?
2. Is it desirable to encourage people to stay at home?

He pointed out that the situations described in the studies related to special populations. Shulman said that the special populations (the physically disabled) in question may have to stay at one location such as at home anyway. Wish thought that people did not want to stay at home all the time but that part-time working from home was a desirable compromise.

Tannenbaum was concerned for the lack of vicarious learning in remote situations. Lucas pointed out that skilled teachers can overcome this and that interaction can take many forms; in most cases it seems reasonable to assume that social good comes from increased interaction.

The discussion then moved to the general advantages of telecommunications. One speaker emphasized the view that telecommunications can provide a wider choice for students; another the value of long-range communications which permit one to draw widely scattered specialists into the traditional classroom. Zorkoczy felt that distance education systems must be dynamic and ready to experiment. They should allow people to choose the learning medium which suits them best.

The discussion then centerd on the motivation behind remote teaching experiments. Wish felt that the aim should be to look for need or social benefit and supply that need. Mandelbaum distinguished two strategies. One stems from a need or preference to pick off marginal cases, reducing the pressure for change on the establishment. The other locates settings where pressure on the system can be increased so as to generate change--as in the Open University. It depends whether the motivation is to be an agent of change.

Brownstein highlighted the difference between the Open University situation and the other studies which were experiments. The latter provided poor contexts for agents of change.

Burns felt that the Reading experiment has a proven socializing effect. Moss suggested that research can be conducted on both the process of technological innovation and the impact of technology on social processes. Tannenbaum said that often telecommunications advocates were looking for a place to light instead of focusing on a recognized need. Shinn argued that the people who have the need do not have the knowledge to solve it.

The cost-effectiveness of telecommunications systems was then discussed. Brownstein pointed out that while the cost of services was increasing the cost of telecommunications was decreasing. It was widely felt that decisions to use telecommunications were made for political not economic reasons.

Mandelbaum maintained that sales were the driving force behind technical development. This force might work in a direction opposite to that suggested by the research. Bernemyr asked if there was a danger of research on demand falling into the trap of saying that new expensive innovations had no future. He cited the parallel of colour T.V.

Tannenbaum thought too much emphasis in research was put on the 'hindsight' of users, whose attitudes may often be biased. More emphasis should be placed on need.

SECTION FOUR

INFORMATION SERVICES

The Impact of Telecommunications Technologies on Informal Communication in Science and Engineering - Research Needs and Opportunities
C. Ganz and J. D. Goldhar

Scientific Communication and Knowledge Representation
Gerhard Rahmstorf and David Penniman

Communications Aspects of Euronet
Carol O. Vernimb and Garth W. P. Davies

Problems in Forecasting the Price and Demand for On-line Information Services
A.D.J. Flowerdew, J.J. Thomas and C.M.E. Whitehead

The Economics and Cost Benefit of Analysis Services - The Case of Information Analysis Centers
Robert M. Mason

Technology Assessment and Idealized Design
Peter Davis and Edward Freeman

Section Four

INFORMATION SERVICES

The papers in this section describe work in the field of Scientific and Technical Information (STI). First Carole Ganz and Joel Goldhar review research findings relating to the behavior of users of STI and draw conclusions of particular relevance to those conducting research on new telecommunication services. They emphasize the need to be aware that changes in the use of one channel of communication will lead to change in the use of other channels and criticize those who treat new communication technologies as substitutes for existing services.

Gerhard Rahmstorf and David Penniman address the problem of the individual scientist in the face of the rapid growth of the literature. They present a roughly quantified model to describe the current STI system; it is based on notions such as the average reader and the average publication. They go on to consider some proposals intended to make for more efficient interaction between scientific and technical information and its users. Finally they look forward to an electronic "universal text information system" to which access will be possible through computer terminals.

EURONET is a data communications network which is being developed for the EEC. It will provide access via computer terminal to about 100 STI data bases stored in about 30 host computers, and is intended to become operational in early 1979. In their paper Carl Vernimb and Garth Davies provide a brief description of the system and of policies as to its use. They then comment upon possible special features: an automatic referral service; standardization in user command sets; a search and retrieval algorithm in which the user formulates a request by identifying a few relevant documents; technical options and legal issues in document delivery; and automatic translation.

Important questions will arise regarding the pricing of services provided by EURONET. The paper by Tony Flowerdew, Christine Whitehead and Jim Thomas draws on a study conducted for the EEC, which sought to analyze how the demand for these services would be affected by pricing structure and the level of prices. They identify

and briefly discuss various determinants of the demand for on-line services, providing relevant results from a survey of 47 potential users (organizations and individuals). The discussion is then extended to future changes in demand and cost and to the relationship of demand with price over time. Time series data on the use of the UK Medlars service are used to demonstrate the danger of extrapolating demand data from a period when services are provided free in order to forecast demand at more realistic long-run price levels.

Bob Mason presents a second paper on the economics of STI services, in this case Information Analysis Centers (IACs). After providing background information about IACs and an introduction to the issues involved in evaluating their costs and benefits, he presents a model which is consistent with observations on the demand for, and costs of, IAC services. Some numerical results, obtained when the model's parameters were quantified, are presented. The paper concludes with discussions of the present limitations of such research and of more general topics such as the impact of technological developments and some international issues.

The final paper in this section, by Peter Davis and Ed Freeman, deals with the assessment of telecommunications technologies within the context of a future national STI system. As such it is, at one level, concerned with the issues raised in the papers presented by Ganz, Rahmstorf and Vernimb. At another level, it is concerned with the methodology of technology assessment. The authors propose that "technology assessment should become an integral part of an ongoing planning activity which aims to take a more active stance toward the creation of improved systems in the future." They suggest a three-way typology for technology assessment: the intentional system, the transactional environment and the contexual environment.

Since the assessment of "technologies against the backdrop of current conditions or extrapolated futures distorts the evaluation process and perpetuates the errors of the past," Davis and Freeman propose it be carried out in the context of an "idealized design." A brief description of an idealized design of the US STI system (the SCATT System) is presented early in the paper.

The review with which this section opens and the essay with which it closes relate most closely to the broad range of current issues arising in the evaluation of interactive telecommunications systems. The other papers are more specific and, except for Vernimb's contribution, adopt a mathematical approach.

DISCUSSION OF PAPERS BY GANZ, THOMAS AND VERNIMB

Discussant and moderator: Gordon Wells

The main areas of discussion were as follows:

Need for Better Information

The reasons for the collection and review of scientific and technical information were discussed. Ganz said that one rationale was to improve the cost effectiveness of conducting research; there was evidence that improved information reduced duplication and increased research efficiency.

Goldstein suggested that people will communicate, come what may, and Thomas that people will collect and store information any way for a variety of purposes; this in itself was sufficient incentive to try to create more efficient systems. Gabbitas felt that it did not matter why people collected information. The key was that networks lead to a greater-cross fertilization of ideas and more contact across disciplines, leading to better research.

Causality

Ganz felt that, although more research is needed, evidence suggest that people who use information sources effectively produce better research. There is some debate, however, about cause and effect.

Charges

In answer to a question from Williamson, Thomas felt that few data are available on variation of the price-demand relationship over time although the change might be rapid. Goldstein remarked that present evidence is that the method of charging is important even when the service is a monopoly but, if there is competition, it is vital to base charges on costs (otherwise a competitor will spot the anomaly and "cream skim") but he and others pointed out that information services are very vulnerable to money saving measures--telephone bills/budgets will be cut rather than sacking staff in hard times.

Hiltz took issue with the view that it is a form of "unfair competition" for government to use grants to provide free or heavily subsidized telecommunications services for research purposes. She argued that experimental systems can never be competitive in the early stages and that subsidies are essential. Even with zero charge, the cost to guinea pigs is high from learning time, problems with the

technology, etc. Wells suggested that early subsidies were common commercial practice by, for example, computer manufacturers.

Cowie warned of the pitfalls of asking clients how much they would pay. Not only is it difficult for clients to assess the worth of future services, but it is not in their interests to say how much they would pay since this could influence the minimum price. Often they are not the decisionmakers on the provision of the service, nor are they responsible for the budget, which pays for it. Thomas agreed that such information (e.g., from in-depth interviews) had to be collected and treated with caution.

Informal Aspects of Information Systems-Messages

Goldstein and Day pointed out that the ARPANET mailbox was an afterthought--message services are a 'side-effect' that is very widely used. Gabbitas said that message systems are already widely used despite the fact that they are illegal under the policy of many PTT's.

Vernimb said that Euronet could provide these services if PTT policy allowed.

Back up Services

Rahmstorf asked how information was selected and edited in Euronet. Vernimb said that more studies were being undertaken. There are current deficiencies in speed of response and copyrights are an important problem.

DISCUSSION OF PAPERS BY DAVIS, MASON AND RAHMSTORF

Discussant and moderator: Carole Ganz

The use of telecommunications as a mechanism for transferring scientific and technical information was addressed from two perspectives in the discussion: 1. the design of information transfer services and 2. the assessment of these services.

Design of Information Transfer Services

Both Davis and Rahmstorf addressed the design of information transfer systems. Davis focused on what an information system (SCATT) would look like if current organizational and economic constraints were not present and the system's design was based on information derived through the use of a technology assessment evaluation method. Rahmstorf chose to examine ways of improving the design of a current information system. Asked by Ganz to compare the design process of the two systems, Rahmstorf suggested that the systems are similar to the extent that they both represent large scale approaches to information transfer. The Text Information system is different from the SCATT system in its emphasis on structuring primary information in a special handbook-like style and in using non-Boolean text description.

Following this general discussion Rahmstorf suggested two problems in the design of current information systems which his study addressed. Current systems require mediators to assist with information inquiries. The precision of the output is not sufficient because of the semantic ambiguity of Boolean query languages. These problems, Rahmstorf stated, argue for an improved, more precise language for use by scientists which is closer to the natural language. These remarks led to a discussion by several participants on the effect of language on access to information systems. In this vein, Ohlman observed that some form of mid-range language is required for international use, and the international movement appears to be reviving. For example, the work of Charles Bliss on "Semantography" has at last found its application as a medium of communication for physically handicapped nonverbal children in Ontario and another pictogram-based language has been developed in Japan by Yukio Ota. Corresponding anti-Babel trends can be detected in recent developments in computer networks. Euronet, the European Community's planned network for scientific, technical, social, and economic information, has a multilingual program which will provide for automatic translation of scientific and technical texts drafted in natural languages.

Lucas suggested that a theoretically based language similar to that used by anthropologists might be a solution to the problem. However, as Ganz pointed out, basing systems on disciplinary languages implies that the disciplines of systems users are similar to those of systems generators. For example, interdisciplinary research users find it difficult to access systems based on discipline languages.

Another issue in systems design which also affects access is pricing policy. Mason pointed out that with respect to IAC's, the initiation of fees resulted in a relatively large drop in demand for these services. Subsequently, however, the demand appears to resume its prior growth at a rate near the prior rate. Anecdotal evidence indicates that charging for information services represents a problem for both the information supplier and the consumer. On the one hand, engineers and scientists may be embarrassed to request money for access to an external information system when they have been hired as experts. On the other hand, IAC managers tend to suffer from a "library syndrome" and do not want to charge for previously free services. Hard data on the impact of instituting fees is difficult to obtain since information services have traditionally been provided without charge.

It was pointed out that perhaps the real question with respect to access is how it is related to distribution. Lucas observed that access modes affect the distribution of information and suggested that if overhead rather than direct costs are used to pay for system access, distribution might be better. Ganz indicated that most arguments to date surrounding information systems are based on productivity increases, not on distribution issues. The question of distribution has only been looked at very recently. Hiltz and Ganz agreed that the relationship of information access to productivity is unknown. For example, we don't know whether less productive scientists can become more productive if they have access to better information.

Assessment of Information Systems

Assessing information systems was raised by Elton with respect to the state of the art of technology assessment methods. Davis indicated that the question which technology assessment was meant to address in his work was: how can the process of information retrieval be more productive and interactive? Since technology assessment literature tends to be very specialized, Davis **et. al,** looked at levels of technology assessment in approaching the design of SCATT. These levels include assessments of the intentional purpose of the technology, the impacts which can be linked directly to the technology's implementation and the consequences of the technology which are unintended. In addition, Davis recommended the use of participant observers in evaluating information systems. He

suggested that the precision which this method lacks would be outweighed by the greater depth of understanding it would allow.

Mason also stressed that need to include assessments of factors other than the immediate purpose of the technology. For example, economic assessments should make it clear that economic factors are only one element of evaluation. In the internation arena, he pointed out, national prestige or national defense needs may override economic considerations. Lucas supported incorporating a range of factors in evaluations, including any social and psychological costs of the person using the system.

SECTION FIVE

TELECONFERENCING AND COMPUTER CONFERENCING

Use and Traffic Characteristics of Teleconferencing for Business
G. W. Jull

Evaluation of the Potential Market for Various Future Communication Flow Characteristics
M. Dormois, F. Fioux and M. Gensollen

Learning the Limits of Teleconferencing: Design of a Teleconference Tutorial
Robert Johansen, Jacques Vallee and Kent Collins

Interpersonal Teleconferencing in an Organizational Context
Arthur D. Shulman and Jerome I. Steinman

Organizational Communication Behavior: Description and Prediction
David W. Conrath

Measuring the Dimensions of Interpersonal Communication
Myron Wish

Computer Assisted Communication in a Directorate of the Canadian Federal Government - A Pilot Study
R. H. Irving

Exploiting the Tele- in Teleconferencing
Craig Fields

Section Five

TELECONFERENCING AND COMPUTER CONFERENCING

This section comprises papers on three families of systems: audioconferencing systems which allow three or more individuals at two or more locations to talk with one another (sometimes they are supplemented with systems for the exchange of graphics or text); videoconferencing systems which provide two-way television connections in addition to the sound channels; and computer conferencing systems which allow dispersed individuals to use computer networks for real time or asynchronous keyboard communication with one another. Those unfamiliar with computer conferencing systems may find it helpful to read first the review on this subject in the next section. To avoid confusion it should be noted that some writers use the term teleconferencing to include computer conferencing; others do not.

The use of conferencing systems in health care and education has been covered in earlier sections. Here we are concerned primarily with their use in business and in government organizations.

George Jull reviews the results of surveys of users attitudes to four Canadian teleconferencing systems. Among other findings he reports that the acceptance of teleconferencing is strongly influnced (i) by the pressures of relocation coupled with the inconvenience of frequent travel and (ii) by its being found satisfactory as a substitute and a complement for some face-to-face meetings. The paper concludes by raising issues relating to the aggregation of services for delivery on common facilities. In this regard important traffic characteristics include bandwidth, traffic patterns, privacy, subscriber penetration and spatial distribution.

First in the UK, subsequently in a number of other European countries, surveys have been made of today's communications in business and government (in-person, by telephone, by mail and by Telex) with the idea that their characteristics could be used as the basis of projections of the extent to which new telecommunications services could substitute for them. The paper by Dormois, Fioux and Gensollen reports on a recent French study of this kind based on the use of communications diaries. They describe the methodology employed and some interim results.

In the next paper Bob Johansen and his colleagues show the difficulties of making projections about the future use of teleconferencing and computer conferencing on the basis of current understanding. The actual focus of their paper is the problem of learning how to use these media. They discuss what can be learned from social evaluations of conferencing systems, identifying a number of key parameters. They then describe a "Teleconference Tutorial" which they are developing to assist new users and to serve as a research tool.

The paper by Dormois and his colleagues introduced the use of data from communication surveys as a basis for projections on the scope for teleconferencing as a substitute for established modes of communication. (The reader will already have noted that some papers have carried warnings that the substitution perspective may be too limiting -- e.g., the papers presented by Ganz and by Jull.) An important link in the necessary models is the function which estimates substitutability from characteristics of particular communications events -- especially in-person meetings. Such functions have generally been constructed using one or a combination of (i) common sense and (ii) the results of laboratory experiments. These experiments have been conducted at the level of individuals.

Art Shulman and Jerry Steinman point out in their paper that the deployment and use of teleconferencing services depend upon strategies adopted for coordination of communication among organizational units. They review past substitution studies, in particular the work of the Communications Studies Group (CSG) at University College London, and discuss the limitations of the approach. Then they introduce Galbraith's and Thompson's theories of organizational communication. These are used to extend the CSG's classification of meetings. Within this framework they discuss the use of different conferencing media as substitutes for in-person meetings.

Dave Conrath also approaches interpersonal communication from the perspective of the organization. He reports on an ongoing study to develop descriptive models of communications and organizational structure. The paper describes how data were collected by several methods from three different companies, two of them both before and after the installation of a new telecommunications system. Some results are discussed: who related to whom? what modes of communication were used? for how long? and for what purpose. Finally he shows statistically significant relationships between choice of mode and (i) hierarchical rank (a surrogate for task), (ii) department and (iii) whether "before" or "after". Communication content, however, was not found to be a satisfactory explanatory variable.

Mike Wish describes psychological research at Bell Laboratories on interpersonal communications behavior. This has focussed primarily upon the modality used, the context (or purpose) of the communications, and the relationship between the individuals concerned. Various issues have been investigated: the perceived effectiveness of different modes in different situations; perceptions of the ways in which people in different interpersonal relationships communicate with one another; and interpretations of videotaped interactions. Videotapes were also used to assess the relative importance of the audio and visual channels: for one group of observers sound was suppressed; for another group vision was suppressed.

The paper describes the measurment tools and analytical techniques that have been developed. The main results are presented and discussed.

Ric Irving presents a case study comparing the use, in a Canadian government department, of a computer message system with the use of the more sophisticated computer conferencing system which replaced it. Information is provided on usage statistics and answers to a questionnaire on attitudes. These have implications for the design of such systems and for the way they are introduced into organizations.

The section concludes with a statement by Craig Fields, calling for conferencing systems which are designed substantially to improve upon established forms of communication, rather than merely imitate them.

Taken as a whole these papers provide a comprehensive view of the current states of understanding and of methodology regarding the role of teleconferencing and computer conferencing in organizations. The papers by Jull and by Johansen _et al_ provide useful non-quantitative introductions to some of the current issues in the field.

DISCUSSION OF PAPERS BY DORMOIS AND FIOUX, JULL, SHULMAN AND WISH

Discussant and moderator: Norman Gleiss

The discussion centered on the motivations for research in the area of telecommunications applications in Business and Public Administration; a dichotomy was seen between research based on technical development and that based on communication needs.

Wish felt that more emphasis should be put upon communication needs and that social science should play an active guiding role. Questions of technology are meaningless unless basic concepts are understood. Cowie thought that both aspects were important but that there are many barriers to be broken down in an area of 'hybrid research'. For example, the engineering and social science departments in universities often have little contact with each other and this separation also applies in national forums which plan research. Moss suggested that research directed toward theoretical issues be distinguished from problem-focused studies which are oriented toward policy making. Jull said that research in Canada was entering a new phase of organizational objectives. This sets new constraints on the existing pattern of communication, e.g., relocation and decentralization had changed attitudes towards face-to-face meetings. The new programme of research must address these issues and at the same time produce a system which technically fits the demands of users. Gleiss suggested that research was not using the available information to define the market. There is a wide gap between the apparent demand and actual use. Goldstein relied that this 'gap' is an important marketing question; laboratory experiments will not discover why people buy a system. We must gain more understanding of how and why people communicate in certain ways and study the channels of organizational communication. Wish agreed that much research is needed into the organizational context, needs, the value of time, decision makeup and the processes of meetings, and practical studies of group communication. Shulman pointed out that the need to take in the organization's structure and goals is evident; without such a context we would, in all probability, continue to be able to explain only about five percent of the behaviour in question. The problem, however, is in defining what we mean by organizational context for the individuals, for the groups and for the organizations. Standard taxonomies of context need to be evolved. Some of the presenters have initiated this task. However, there is a long way to go. For all those who are getting excited about bringing in the organizational context, he noted that these organizational contexts have yet to be worked out. You will not find a ready-made taxonomy.

Tyler illustrated a 'barrier of adaptive effort' which must be crossed by telecommunications users; research has not fully realized the significance of this. Gleiss then posed the question 'At whom should the research be aimed ' Goldstein answered that it is the managers who make the decision to buy telecommunications, so they are the level at which to aim. In addition, we should look at the needs at clerk/client level as these are frequently the actual users. Rockoff pointed out that in the health industry the decision to purchase is made by health system providers (for example, doctors) and managers while many of the benefits (such as reduced in-person referrals) accrue to patients and third party payers, not the providers. Others agreed that this is also the case in business applications. Brownstein felt that the aim of research should be to give managers new choices. Tyler suggested a two-level approach--the needs of the individual on the one hand and organizational interaction on the other. It was generally agreed that research should move towards a more field based, practical study of the market-place and of the communication patterns and needs of users.

DISCUSSION OF PAPERS BY CONRATH, IRVING AND JOHANSEN AND STATEMENT BY FIELDS.

Discussant and moderator: Percy Tannenbaum

The session began with a discussion of the advantages and disadvantages of teleconferencing. Tannenbaum felt that conference calls can be very efficient and do not waste time, but only so long as everyone has done his homework. More preparation is needed than for a face-to-face meeting. However, he missed the 'gossip' and personal interaction: to use teleconferencing we need to overcome old habits and adopt a new set of expectations and practices. Researchers should use the systems themselves in order to appreciate where they do people some good and where possible harm. Those present were asked if they had actually used systems for business and for personal interactions. (Result: about half for business and a few only for personal use.) One participant said that the public does not know of existing conference call facilities in the United States. Ohlman felt that the telephone is seen as a dyadic medium and that this is a barrier to conference use; another barrier is the lack of confidentiality and the extra time needed for set up also discourages use. Lucas suggested that combined systems should be developed. Rockoff added that graphics facilities should also be included. Conrath said that complex complementarities were involved, both simultaneous and sequential. A face-to-face meeting and mailing is necessary before a successful teleconference can take place. Tannenbaum said that there is a 'cost' to the individual in using any teleconference system or systems--an incentive is needed to overcome the initial extra effort. Wish said that this incentive exists in such aspects as the increasing costs of travel. Most groups using teleconferencing, in his experience, were using it regularly. Elton felt that the most important question is whether it is easier to do the business as a whole by teleconference. It was generally felt that this could best be achieved by combining different systems.

There followed a short discussion on CB radio. Ohlman asked if any sociological studies were being made. Shulman felt that it was being studied out of context of other communications systems. Ohlman saw CB as developing under a new group psychology. In the future, CB and mobile-telephone markets may merge, providing for both mass and individual voice-communications needs within the same system. Shulman suggested that it was not a new psychology; CB users now communicate by other modes e.g., by face-to-face meetings. Tannenbaum pointed out that no one would have predicted

the phenomenal growth of CB. Burns suggested that this growth is due to the fact that CB fulfills a need and is very easy to operate.

The discussion then moved to the contribution by Fields. This was felt by Tannenbaum and others to be a very specialized case, relating to a position of maximal need for such a system. Fields said that, in this case, there is actual advantage in distance--an active need to 'put something between' the actors involved. It is also exceptional in that it is for crisis situations in a purely military context. A further distinction is that in such cases cost is an insignificant factor; only relative cost-effectiveness has to be considered. The ensuing discussion questioned the effect of crisis on use. One cannot simulate crises for purposes of design and evaluation; the real test is whether or not the system is used. Shulman said that repeated crises are no longer crises, but routine matters. Organizational structures can be set up to make crises a routine. Fields replied that the alogrithm he had described is based on people's preferences and makes decisions based on these. Irving remarked that the kind of information required to make a decision can only be established if previous knowledge of the crisis is available. This is unlikely as there are no patterns in crises. Fields described the weighting system and explained that the scheme used is adaptive and incorporates automatic filtration. The criteria required for the linear model do not vary dramatically. Irving argued that the issue is not the weights, but whether the criteria underlying the weights are relevant. Fields countered that the test was the high degree of agreement between automatic and personal selection. The machine can do the same job as the individuals given the same information--but is faster, cheaper, and more reliable. Ohlman pointed out that the penalty for being wrong in these circumstances was enormous. Tannenbaum felt that some risk must be taken, however a decision is made. Fields pointed out that the system would be used in cases of terrorism, in which there is little time for decision-making. He added that organizational acceptability of the system depends on: (1) the desire to keep and control power; (2) the desire to solve the crisis. A balance must be found between the optimal speed of decision-making and the conventional hierarchial structure. Tannenbaum concluded that no valid generalizations about teleconferencing systems can be drawn from such a specialised system and that researchers should beware of this fact.

SECTION SIX

NEW SERVICES

The Swedish Market for a Public Switched Multi-purpose Broadband Network
Bjorn Fjaestad and P. G. Holmlov

A Possible European System for Teleconferencing via Satellite
B. Drioli and J. L. Jankovich

Viewdata Networks
Samuel Fedida

Computerized Conferencing: A Review and Statement of Issues
Murray Turoff and Starr Roxanne Hiltz

Section Six

NEW SERVICES

The common element in this section's papers is the description of new telecommunications services. Each paper, however, approaches its subject from a very different perspective.

Björn Fjaestad and P.G. Holmlöv describe plans for the pilot test of a public switched broadband network in Sweden to be used for picture telephones, high speed facsimile transmission, video-conferencing and the interconnection of security television systems. They report on the first ("before") wave of an intended series of market research studies seeking to monitor needs, resources and attitudes toward telecommunications systems. Results are discussed. It seems that relatively few organizations are interested in participating in the trial; high speed facsimile is regarded as the most attractive of the services and electronics companies exhibit more interest in the trial than do other types of organization.

Bruno Drioli and his colleagues are concerned with a possible European system for teleconferencing via satellite. One part of their paper describes issues of technical design and the proposed system. The other part reports a study seeking to estimate the size and nature of the market for its services. A substitution perspective is adopted and, relatively speaking, very high estimates of demand are obtained. The study was conducted before much of the research described in the preceding section was published.

Viewdata is a new information service developed by the British Post Office for which market trials are scheduled for mid-1978. It makes use of the telephone, with a push-button facility, to call up information directly from a computer, and of the television set, with an adaptor, to display the retrieved information. The Post Office would act as the middleman between providers and consumers of information, whether in the office or in the home. The flexibility, capacity and promised economies of scale have aroused a great deal of interest in many countries. (See, for example, the comment about Viewdata in Thompson's paper in the next section.)

Samuel Fedida has led the design of the system. His paper, atypically technical for this volume, explores various networking designs which would remove residual needs for human involvement in the operations of the system.

Murray Turoff and Roxanne Hiltz provide a comprehensive overview of computer conferencing and of possible services which may come to be associated with it. They go on to discuss the problem of assessing its impact and to raise a number of policy issues. They conclude that such services "should be open to the widest range of investigation and experimentation with the greatest possible incentives to encourage individuals and organizations of all types to be involved."

We start this section with a synopsis of the after-dinner presentation by Edward Goldstein on the Bell System's experience with visual communications systems, in particular with the use of Picturephone® Service in the criminal justice system and with the Picturephone® Meeting Service. The predecessors of these services were not the instant successes originally envisioned; now, however, "the future of visual communications services appears to be very favorable." As Director of Product Marketing for AT&T, Mr. Goldstein is uniquely placed to summarize the Bell System's experience in this area and to comment on the future outlook.

DISCUSSION OF PAPERS BY DRIOLI, FEDIDA, HILTZ AND HOLMLÖV

Discussant and moderator: Stuart Yerrell

Yerrell began the discussion with a table depicting the characteristics of the systems presented in the papers:

System	B/W	Basic Use	Main User	Typical Contact Time	Typical 'Transⁿ' Time
U. K. Viewdata	Narrow	Information	General Public	secs/ mins	Indefinite
Computer Conf.	Narrow	Information & Communication	Profes- sionals	hrs/ days	secs/min
European Tele- Conferencing	Broad	Conferencing	Profes- sionals	days	Instan- taneous for most services
Public Switched Broad Band System	Broad	Communication	Profes- sionals & Public	minutes	

Next Yerrell outlined what he felt were the major issues contained in the papers to help structure the discussion:

VIEWDATA:

- Develops general network theory
- Methodology of evaluation used
  - Pilot trial
  - Next stage
  - Theoretical base

SWITCHED PUBLIC BROADBAND SYSTEM:

- Actual results of prospective study
- Methodology (sample size, control groups, etc.)
- Contribution to overall knowledge

COMPUTER CONFERENCING

- Poor empirical foundation for analysis of impacts especially on users--the need for research
- Danger of premature regulation
- Nomenclature and taxonomy

EUROPEAN TELE-CONFERENCE (Satellite)

- Actual results of market study
- Methodology used: weaknesses, strengths

Yerrel remarked that at first sight the only similarity among the systems was that they all ran by electricity; he suggested that the discussion focus on issues of their evaluation and the methodology for this, rather than policy. With respect to the paper on Viewdata networking, he suggested that the discussion focus on the methodology used in evaluating Viewdata thus far, e.g., what are the criteria for evaluation? He saw it as the largest new system in the near future which would affect ordinary citizens as well as professional users. The paper on computer conferencing also pointed to a problem in evaluation -- the poor empirical foundation for making decisions. Although data are available on the macro-level effects of this technology, we don't know why these effects occur. There was nothing equivalent to the pioneering CSG work on face-to-face encounters. Another question, raised by the switched broadband system paper was whether the results were artifacts of the methods used.

Cowie felt that the Viewdata paper addressed the possible technical development of the system and did not consider evaluation. The market trial stage will provide more information about practical aspects of the system, e.g., how people feel about using the system; attitudes to costs; how sophisticated and unsophisticated users react to the same system and the overall acceptance of the system.

Conrath pointed to the underlying issue brought out by the papers which is the need for cooperation and awareness among researchers of different systems. For example, Hiltz did not make references to the work conducted by Englebart. How does this previous work fit in with Hiltz's findings? Other studies have also been done relevant to the European teleconferencing system but appear to have had no input into the paper. Or in the case of Viewdata, can the instruments be used to evaluate that as well as other systems. All this, in Conrath's view, points to the lack of communication between communicators about research results and evaluation.

Yerrell agreed that there was a problem of communication in the field and mentioned that this constitutes a problem on the national as well as the international level.

Another speaker then mentioned that the Viewdata technology, under another name, had been well accepted in Germany and that a market trial for payment will be run. This speaker suggested that we don't need new research. The French are contemplating a Viewdata System.

Ohlman said that the distinction between narrowband and broadband communications is more of interest to systems engineers than to users. Unless they are large users, who must deal with time-cost tradeoffs, most users are unaware of the type of channel over which they are communicating. Much more important to them is the distinction between "mass" and "class" communications systems. For example, Life magazine may have vanished because its market was based upon the voracious appetite for pictures by the general public, which became better satisfied by television. However, specialist magazines giving emphasis to hobbies, sports, consumerism, entertainment, etc., have flourished. In the future, the "class" extensions of television (cable, interactive games, teletext, etc.) will attack and likely displace many of these lucrative information markets.

It is a truism that new systems cannot flourish without good market research and adequate promotion. It is doubtful if such potentially dramatic and far-reaching innovations as telephone conferencing have been adequately researched and promoted, tacked on as they are to communication networks never designed for their switching and fidelty requirements.

Bernemyr said that data show very little demand for video but he doesn't believe that data because we don't know anything about the real demand until we have practiced the product. He pointed to television as an example. We didn't expect color to add much to that system but no one would suggest return to black and white. Adding picture facilities to audio systems may well be analogous to color television. Do, Bernemyr asked, researchers have methods to forecast the future impact of technology once it penetrated the society? We tend to fix on the costs of today's technology--but should focus instead on tomorrow's new and low cost technology.

Baudazzi mentioned that EDP, telecommunications and electronic mail appear to be converging, and that may make it necessary to reorganize how PTTs approach these services. Several nations have seen the decrease in the volume of some classes of mail along with a rise in data communications. It will be important in the 1980s to reconsider postal services in more general terms in light of

these technological developments taking place in the field of electronic communications.

Cowie said that new technology may enable the better provision of existing services or give opportunities for new services. In the latter case, a commitment to a new capability may generate demand levels which justify the decision but this is not guaranteed and it is expensive to get it wrong. Hence the providers try to reduce the risks with as much experimentation as possible around an evolving programme of new capabilities.

Wells asked Cowie for an explanation of the purpose behind Viewdata, and said he understood it was to decrease the under-utilization of domestic lines. If the minimum charge was one call unit, this might be too much if the information is easily available elsewhere. On the other hand, the perceived costs of the service to the consumer may be more important than the actual costs.

Cowie said that a simple charging formula would apply to Viewdata customers but detailed costing information was not available. He thought that the original concept of Viewdata was that it would primarily be an information retrieval service to the residential user but its potential in the business community and for other applications was now being recognized.

Hiltz stated that Viewdata can be seen as a limited subset of computerized conferencing. Specialized systems like Viewdata offer only a few services; she suggested that users will soon want more interactive capabilities than the Viewdata system currently provides. In responding to a comment on secretaries, she stated that this is a problem; that males who do not know how to type and who interact only through secretaries tend to see the system as more cold, formal, and limited in usefulness than those who at least occassionally get on line themselves. A researchable question is how to resocialize those who are not accustomed to computer terminals and who resist using them. To some extent, experimental evidence suggests that this is an age problem as well as a sex-roles problem.

Irving suggested that people also tend to fear computers and that we must accustom people to the technology. We don't even know, he said what the impacts of the technology are, much less how to measure them. While many researchers talk about impacts, research on impacts is almost non-existent. What is needed is impact research over time; in other words, "before and after" studies.

Hiltz agreed, stating that all field trials should include an attempt to monitor the full range of possible impacts, and that multi-method approaches are necessary to do this.

Mason commented on the utility of forecasting, saying there are techniques and models that seem to work. These are particularly useful when one is replacing technologies which perform the same function. Unfortunately, in many cases, it is a problem of replacing old technology with one which performs more functions. The additional functions may be as important in determining effects or impacts as the original functions. Mason suggested that if technology is feasible, if it doesn't harm anyone *a priori;* and if there is a demand such that it will be purchased, then the technology almost certainly will be developed. In such cases, we may know what the secondary impacts are only after they have occurred.

Fields said that future technology costs are important and not impossible to estimate. And he added that systems like Viewdata may be rejected because the data is poor.

Holmlov talked about attitude testing for the Swedish system and gauging the interest of potential users. He remarked that the probability of demand for service referred to a test network, while the measured interest referred to a larger, full-scale network. Holmlov agreed with Conrath that instruments should be shared.

With respect to Fields' comments about not needing research, Hiltz stated that if the system works, Fields may be right. But what if the system doesn't work, and research hasn't been done? Then we have no way of knowing why it failed; and whether some relatively minor change in design, training of users, or implementation might produce a "success."

Clark said we can construct more technology than we can use--what's lacking is the ability to identify market needs and use existing technology to satisfy them wherever possible. New tools for estimating potential demand are urgently required.

Drioli suggested that the problems with long-range, futures oriented studies is that you don't know the needs or how they may change over time..

Yerrel reviewed the discussion, finding two recurrent themes. First, it was evident that communication among peer groups is poor. Second, work was needed to find ways to explain the impacts and use made of communications systems which did not rely on specific technologies.

Bernemyr concluded the discussion by saying that if we look to the theory of human communications, we find that human communication is more durable than the particular technology used to communicate. He suggested that the software in communications should

also be considered. For example, with respect to Viewdata, the quality of the information must be considered--whether it is reliable, current, and whether it is the information the consumer wants.

SECTION SEVEN

THE INFORMATION SOCIETY

Information Technology and Society
Gordon B. Thompson

Information and Communication: Is There A System?
Jean-Claude Cohen, David W. Conrath, Philippe Dumas and Gabriel du Roure

Information, Energy and Labour Force
J.G. de Chalvron and N. Curien

Electronic Funds Transfer in Perspective
J. Michael Williamson

Section Seven

THE INFORMATION SOCIETY

The papers in this section are gathered from three different sessions of the Syposium. They are linked by a concern with the changing role of information in society. In his paper, delivered from Canada using a somewhat rudimentary audioconferencing arrangement, Gordon Thompson distinguished between two types of innovation in terms of the impacts they produce. For the intensive class, first order impacts are the most significant; notions of efficiency, productivity and labor release predominate. For the extensive class, higher order impacts are the more important; here notions of transformation, wealth creation and labor absorption are predominant. He suggests that in the interaction between information technology and society the extensive class is, to our detriment, being inhibited, and discusses three constraints which may be responsible. The paper concludes with a discussion of strategies which may redress the imbalance between the intensive and extensive classes.

The paper by Cohen, Conrath, Dumas and du Roure, presented by Gabriel du Roure, focusses upon the growing overlap between communication systems and information systems. The authors discuss the desirability of wholescale integration between the two and the reasons why it has not come about more quickly.

In a highly technical paper Jean-Guy de Chalvron and Nicolas Curien contribute to research on the information economy, a subject which has aroused a great deal of interest in the USA over the last two years, largely as a result of the work of Marc Porat. They develop Leontief's model of a national economy, so that a distinction can be maintained between informational ("organization") and other ("realization") work when using the model to examine flows between different sectors of the economy. ("Organization" is associated with channeling information and "realization" with channeling energy.) Illustrative results are presented and discussed.

Money is a form of information which can be radically affected by developments in the electronic processing and transfer of information. Mick Williamson was invited to present a paper on the subject. He provides a broad review of current and prospective developments in the field of electronic funds transfer (EFT), pointing out that physical processing and transmission of notes, coin, checks and so on will be progressively replaced by the automated processing and transmission of information through data networks. He notes, however, that public discussion of the subject is frequently ill-informed and misleading, wrongly suggesting that the cashless and checkless society is imminent. (About 98% of all payments by individuals in Britain and in the USA are still in cash.)

After reviewing changes in banks' payment and associated systems, he turns to change outside the banks, but within the total payment system, remarking that banks' costs are probably less than half the costs of the total system. He next points out that payment systems are only parts of other systems. After discussing the pace and determinants of change in funds transfer systems, he draws some conclusions about the implications of EFT for developments in telecommunications. He suggests that the implications of the social, technological and economic changes giving rise to EFT will be more signigicant than EFT itself.

There is no discussion summary at the end of this section. Most of the papers were grouped with those of the next section for discussion purposes.

SECTION EIGHT

DESIGN AND PLANNING

The Design of the Designing Community
Seymour J. Mandelbaum

The Utility of Social Experimentation in Policy Research
Allen M. Shinn

Telecommunications and Planning*
Bertil Thorngren

New Telecommunications Services and Regional Development: Approaches to Experimentation and Planning
Daniel Chauche

Planning Exploratory Trials of New Interpersonal Telecommunications
C. D. Stockbridge

*Printed version not available.

Section Eight

DESIGN AND PLANNING

Seymour Mandelbaum provides an essay dealing with the design of the community which designs telecommunications services. There is good reason to question the functioning of this community. He is concerned not so much with its coordination, as with the questions whether there are missing elements, whether the flow of information is adequate and whether the conditions of work are appropriate. These issues are considered in relation to three dilemmas which arise in the design of communication networks: (i) the conflict between aggregation of communications policies and penetration into the depth of on-going systems; (ii) where should be the boundaries of participation in the planning process; and (iii) the competing pressures for rigorous and for robust design of particular projects.

Al Shinn was invited to present a paper on a subject of his choosing. He chose to consider a methodological problem which has loomed large over the last few years, the use of social experimentation in policy research. Social experiments, intended to provide reliable cause-and-effect information, are distinguished from less rigorously designed field trials and demonstration projects. Their major disadvantages are identified and the conclusion is drawn that telecommunications policy research is not ready to use them in many situations. Support for this conclusion is provided in the discussion, which follows, of the problems associated with the disadvantages listed earlier.

Shinn then describes a well executed social experiment, Roger Mark's project in which nursing homes in the Boston area were connected to the Boston City Hospital. His final point is the need to see experiments in their proper place as one of a variety of research approaches. The paper ends with three major conclusions: they concern the relationship between experimentation and theory, the political purposes served by social experiments, and their need for meticulous planning.

Two presentations at the symposium were concerned with the incorporation of telecommunications into central government's strategies for social and economic regional development. Bertil Thorngren summarized pioneering research in Sweden and extracted some challenging hypotheses from it. Unfortunately the paper is not available for inclusion in these proceedings.

The second paper was by Daniel Chauche. He describes recently initiated explorations now under way in France. He starts with relevant goals of the 7th Plan and their translation into questions concerning telecommunications. He then turns to three field trials, which are at different stages of development: "audiographic" teleconferencing, telephone-television information services such as Viewdata (see the paper by Samuel Fedida in Section 6), and TV screenings in public places for special interest groups. Finally he offers some thoughts on a coordinated strategy for the regional introduction of new communication services.

The final paper was presented by Chris Stockbridge using the rudimentary audioconferencing link with North America. While the preceding papers were concerned with global issues, he addresses the particular problem of deciding which locations to include in a multinodal field trial of a new telecommunications service. He describes a practical approach which was developed for the design of the trial of Picturephone^{R} within the criminal justice system in Phoenix, Arizona. Subjective probabilities are used in a heuristic optimizing algorithm which balances cost against a measure of the expected yield of a particular trial configuration. Some statistics are included on usage levels through time in this and another Picturephone^{R} trial.

DISCUSSION OF PAPERS BY CHAPUIS, DU ROURE, MANDELBAUM, SHINN AND BURNS

Discussants and Moderators: Charles Stabell and David Conrath

Stabell began by saying that the papers were provocative in their attempt to understand the forces that shape the environment within which we work. Instead of attempting to be comprehensive, he chose to focus on two themes apparent in the papers by Chapuis, du Roure, and Mandelbaum.

Chapuis and du Roure addressed the concept of integration. In Stabell's view their use of the term is unclear, although they view integration as both in progress and desirable. For Stabell, however, the concept suggests several different meanings: (1) integration, together with differentiation, as a means by which an organization (system) might obtain the necessary variety to be able to adapt to a complex environment (the law of requisite variety); (2) integration through the use of standard interfaces (as in the IBM 360 Series) in order that system components may be changed without having to change the whole system; (3) integration as a resurrection of the now defunct Total System concept.

The last point reminded Stabell of the New York blackout - the city had a totally integrated electric power grid system. A limit to integration comes with the recognition that control of information and communication is power.

Mandelbaum's paper does not identify the actors in his self-designing community. Recognizing who they are might provide an understanding of why the community cannot solve some of the problems discussed. Stabell pointed to the engineering and natural science backgrounds of the participants in the self-designing community. They lack the staying power to overcome their disappointment that behavioral science theories cannot provide the type of information that engineers are accustomed to obtaining: theory does not indicate which medium of communication should be used in a specific situation. They tend to focus on technology without recognizing that communication and computing devices are not well-defined theoretical constructs. Finally, engineers approach the political and scientific components of a problematic as separate analytical elements - which they clearly are not. In particular, big research requires big funds which, in turn, are subject to big political pressures. One way to reduce their interdependence is obviously to opt for smaller research efforts.

Conrath stressed that the issues of policy and methodology are not separate. The du Roure and Chapuis papers ask for a research scenario but ignore the problems of their own research community. The structure of the research community affects research.

The central theme of Shinn's paper was a plea for staging rigorous experimental research. Burns' paper related much more to research experience than to hard numbers. In Conrath's view there is frequent neglect of an ethical question that arises when technology is introduced in field experiments. Since service often cannot be provided beyond the experiments, what should be done about the increased expectations of the participants in them?

For Conrath the points raised by Mandelbaum on robust design did not necessarily indicate flaws. However, the conflict between broad perspective and narrow specialization is a problem. It can be overcome because it is possible to combine depth and integrative studies. But, to date, we have not done an adequate job of handling research to bridge the conflict Mandelbaum points up. Another participant questioned the idea of carrying results from the laboratory environment to the real world. The laboratory, he said, is not representative of the real world. The real question is whether the empirical researcher extracts anything from the laboratory? Shinn distinguished between the purposes of field and laboratory experiments. For hypothesis testing, the laboratory experiment is better. In his view the Reading project served political goals excellently, but scientific goals less well, in large part because these were more difficult to define. He suggested that there is tension between science and politics and one experiment may not be able to resolve questions for both. On the other hand, the Reading project could be considered to have provided an opportunity for much good research which was not itself entirely experimental in nature.

Regarding the Reading experiment, Elton suggested that it does allow us to reject the null hypothesis: the experimental system <u>did</u> work. There was an important hypothesis generated too: spontaneous two-way interaction can be a powerful alternative to traditional TV production. Although the research is still in progress, it is clear that there will be valuable output of a theoretical nature derived from behavioural observations.

Moss said that the burden of proof is greater for the Reading cable project specifically because it has survived beyond the experimental period, unlike many projects which are evaluated on the basis of narrower criteria. The design of the Reading project allows it to be evaluated in terms of the hypothesized effects as well as its broader social and political impact on the community.

There is always a trade-off between the rigidity of an experimental design and its capacity to capture and reflect the full range of effects generated by any treatment. The choice of research strategy should really be a function of the type of questions being asked and the nature of the evidence necessary to answer those questions.

Hiltz stated that a field experiment is doomed to failure if we think we can predict all outcomes and develop good measures ahead of time. In her opinion, researchers must mix "soft" and "hard" methods in analyzing a project. The unanticipated outcomes may be the most important ones; and these are best detected by such ethnographic methods as field observation and unstructured interviews. Brownstein pointed out that the goal for the projects, of which Reading was one, was to be able to say whether two-way cable can provide socially useful services. The answers are unambiguously yes. With regard to Shinn's concern about politics, Brownstein said that major political problems did not materialize for the NSF-sponsored projects; he did not accept major social change as a function of the projects. Goldstein agreed that the laboratory is not the real world, but added that neither is the field experiment the real world. In the real world someone puts real money on the line to introduce a new service. Brownstein agreed that field experiments are not the real world because of the experimenters' stake in the projects. This stake intrudes into the research. The question is, can one generalize on what has been learned?

Shulman said that no one approach to research will provide all the answers. Obviously, each one has its own shortcomings. It is only in their combined use that we obtain a good understanding of a phenomenon we are interested in.

Stabell noted that we don't find theories, we create them. Much of the empirical work that has been done could have been explored theoretically by sitting down and thinking. Referring to Stabell's points on integration, Thorngren said that one may decompose the design system into a number of subsystems. The Reading project might have been done with another type of technology. Stabell felt that research should focus attention on interfaces and should not be overwhelmed by the seeming dissimilarity of systems.

Wish said less support was now available for basic research on interpersonal communication than in the past. Perhaps people are expecting too much from research. Who will support basic research in the future at places beside Bell Labs? How do you choose among types of basic research?

Regarding questions of social science methodology Tyler said that we are sometimes intimidated by physics. The result is that some researchers seem to believe that scientific activities only occur in laboratories or controlled experiments. We need to pay serious attention to other kinds of data. For example, we do not know what the benefits of services are worth to people who have not experienced them, if the services must be offered on such a scale as to make field experiments infeasible. Reading addresses the ethical question of continuity, raised by Conrath, because the community now supports the service. In response to a question whether behavioral laboratory research is on the way out, Tyler suggested that while this is not entirely true, support for such work has waned because much of the action in the real world is not in areas which can be addressed by laboratory research. Lucas added that science should be viewed in terms of uncertainty reduction. All NSF's projects are either rejecting hypotheses or tentatively accepting them. In field experiments we try to reduce uncertainty about the markets for services and other questions that cannot be answered in the laboratory.

Chauche said that the real world is concerned with technological innovation, while field experiments are concerned with social innovation. What are the links between the two? The field test is a link which connects the laboratory to the real world.

Stabell felt that the link between research and practice is method. An important function of the research community is to develop methods and establish their validity and applicability.

Goldstein argued against the view that things happen in a logical progression from the laboratory through field experimentation to the real world. Entrepreneurial activity intervenes: somebody decides to take a risk by committing a large amount of money (compared to the cost of research). There is a need to understand people's willingness to pay for services, not just their willingness to use them. He warned against trying to do everything through research, adding that researchers are needed to clarify concepts and add to understanding.

Jull said that Canadian experiences have identified several factors which he believed are fairly obvious: for example, constraints on travel funds have an impact on teleconferencing. But while we know there is some impact we do not know how much. In his opinion, the usefulness of interpersonal telecommunications cannot be broadly generalized: their value depends on the particular environments of application. Nevertheless, it would be useful for researchers to agree amongst themselves on research procedures to identify constraints and driving forces which

influence the use or nonuse of new interpersonal telecommunications services in particular environments. From this it may be possible to provide useful guidance to telecommunications planners.

Goldstein stated that it is the service provider's responsibility (and problem) to develop products which are attractive enough that people will buy them.

Ohlman suggested that useful statements could perhaps be made about impacts if someone were to pull together all the research findings. It might be worthwhile to concentrate upon this. In reply Conrath pointed out that this is difficult when the bases of analysis are so different.

Hiltz did not agree with the position that the "Laboratory to Field" model is always the best for developing research methodology and testing hypotheses in the telecommunications field. In many cases, she said, researchers can use observational data from field trials to suggest what are the most important casual relationships and what appropriate indicators or measures of these variables may be; they may then return to the laboratory to test these hypotheses.

Mandelbaum suggested that it is very hard for large numbers of people to develop careers in the design of telecommunications applications. Do we just "use" people like Red Burns or can they be created? More such people are needed, for we must certainly engage in hard and sustained systems design.

CONCLUDING COMMENTS ON THERMES RELATING TO POLICY AND METHODOLOGY

POLICY: LAWRENCE H. DAY

This was not designed primarily as a policy conference and there was not any significant focus on particular policy issues. These issues did, however, emerge in the discussions.

I have used a "hit system" in preparing this summary: each time a point arose in the discussions and started to repeat itself, if I thought it was a question of policy (in the broadest sense of the word), I made a note of it. These "hits" are the basis of the following remarks.

The first and most discussed issue (in fleeting shots) can be labeled the productivity (cost-benefit) type of question: "Why do people use these systems we try to produce, test and sell?" In the discussions of STI, the CTS Satellite, the Reading Cable TV Experiment, Eurosat, EFTS, Telemedicine and so on there was a continuing question of whether any cost-benefit trade-offs were achieved, although we knew we were serving some sort of useful purpose. I think that this highlights a policy problem in that with many of the systems that we put together, we think or hope we are serving useful purposes, but when we start trying to caculate the cost-benefit trade-offs, it gets very tricky. We have to play some very interesting games with the calculations and nobody believes the results when we are through calculating them.

I noticed that this point continually came up and then disappeared again. It is one real problem we have in planning for new telecommunications services: in many cases we do not know if they meet stated or unstated cost-benefit trade-offs. There was one exception to the rule, the usual exception, and that was for military systems. Craig Fields said that cost is no object when the cost of a mistake is so high. That was in marked contrast with what everybody else said.

A related issue was the question, "Whom are we designing these things for? Who are the users?" We seem to be confused about who the real users are. Are they ourselves as academics or as scientists? Are they managers or military officals? The fanatics or "real people?" In the discussion of EFTS it appeared that there were some real people who seemed to know what they wanted to do. In many cases, however, we do not seem to have made the step from the trials, the in-group playing around with new technology, to those who will be the ultimate buyers.

One of my favorite interests arose a few times: the fact that users are exploring as well. They are defining services around the capabilities that are being provided. The subject of user-driven applications brought out what I noted as the rising illegal use of technology: the fact that delivery of certain STI services, computer mail and computer conferencing appears to be - or recently to have been - illegal in various European countries. The things that are really turning users on appear to be against the rules.

I used three different labels for another question that we covered. Each of them has probably been the subject of a previous NATO conference. I refer to the concept of innovation, sometimes called technology transfer - a buzz word a few years ago - and sometimes labeled decision-making. We were often reminded about the "real world" and this brought out questions of how decisions get made, who makes them, who puts the money up to make things happen on an experimental basis and on a real world basis. There is also an issue relating to certain social services where there will not be a sufficient demand if individual users have to put up their money. Who aggregates the demand for social services, in telemedicine, in communities like Reading?

A number of other issues surfaced. Policy can inhibit innovation as Roxanne Hiltz and others mentioned. Jim Cowey brought up the concept of the emotional context which I believe to be important. Inertia was a term used several times: the idea that things do not happen as fast as we would like.

It may be an unfashionable word to use but this business goes through fads; it goes through cycles. We did not talk about some of the neat things we used to talk about in meetings like this. Satellites were hardly mentioned. They used to be very important in the sixties. We mentioned computer communications a bit. That used to be important too. Interactive cable TV is really a "blast from the past." It used to very important though you do not hear much about it now. I think you will start to hear more about it again soon as the experiments start to be reported upon. Well, the old fads did not emerge too much here.

There was a discussion of policy intersections. This was basically the North Americans versus the Europeans. There seemed to be a European view which can be expressed as, "You silly idiots over there are going to cause a lot of problems for us in Europe." That is true. Many institutions are not really designed so that they can handle these types of pressures. You cannot contain as nicely and easily in the European environment as you used to be able to. That is causing considerable discomfort. I know that if I worked in Europe I would feel very discomforted too.

There seems to be a "Let's handle things more conservatively" view versus a "The world is falling apart" approach. (I am sure that some of our European colleagues were not too thrilled with the fact that the basic telecommunications policy chaos that exists particularly in the United States, and to a lesser extent in Canada is now starting to move eastward across the Atlantic. Frankly I would not blame you if you are a little upset about it. If you can slow it down, I think it would be a wise thing to do. That was an Editorial Remark, not direct reporting of the conference results!)

We discussed the politics or policies of integration, whatever that term means - too many of these words we never define. Sometimes we talked about the integration of technology, which is one important concept. Techologies result in services. In telecommunications we basically sell service; we do not sell hardware, though we sometimes think we do. But the services are starting to become integrated. The users are starting to integrate things at their end. They are starting to expand their areas of control. And this is a new phenomenon.

There was confusion in much of the discussion of integration because sometimes we were concerned with technological integration and sometimes with integration of services.

Finally, we did have a wild discussion on the sociology of doing policy research, which I personally labeled as an "Airlie Conference East Discussion." (The Airlie Conference is the annual telecommunications policy conference in the U.S.A.) The discussion yesterday was very reminiscent of some of those discussions. But one of the good things about this meeting is that we did not degenerate, as so often happen there, into a gripe session with a bunch of people complaining that "nobody loves policy researchers."

POLICY: CHARLES N. BROWNSTEIN

I have tried to cover issues not discussed by Larry Day, and because we attended different discussion sessions I may have succeeded. My strategy was to try to report on the themes that people who were presenting points of view from the audience drove home most strongly. I noted about a dozen points, and I offer a few of my own.

An early theme, one that we came back to in considering telecommunications policy as opposed to research policy, was the critical importance of industry economics in the development of services. Along those lines it is important to realize that, even when one considers industries internally and tries to look at what impact methods of control have on them, external variables such as acceptable systems of accounting and tax policy may have as much to do with industry structure in the end. Or, in getting from here to there (if you know where you want to go), they may have at least as much effect as regulatory mechanisms and other variables of policy research which are rather more normative. These processes are at least as critical as regulatory processes in systems development, in the shape of the system when it is developed, and in the way it can be exploited as it is being developed. That was a very good point made very clearly.

Another interesting point, relating rather less directly to telecommunications policy, was that research, in addition to answering specific questions, whether of a basic nature or, for example, concerning marketing, can force policy attention in given directions. In many ways that may be one of the strongest uses of research; rather than push policy to specific conclusions, it may just focus attention. In that way, I think, the fads (see Dr. Day's review) may be a symptom of something else working in the system, something to do with pushing people's interests around.

This, of course, is an assumption that must be tested, and in order to test it one must enter areas of policy which do not involve telecommunications directly. Medical policy, service delivery

policies, development policies, and transportation policies may push telecommunications policy around as much as vice versa. And this puts telecommunications researchers interested in these broad issues squarely into a very messy area of science policy interaction, which is itself a small industry, at least in the United States.

There are other indirect things that certainly effect what we do and affect public policy. Satellite research was a good example. Locating socially benefical applications, while of great importance in itself, may also be considered to some extent an instrument of foreign policy, in the sense of supplying foreign aid or reserving slots in the variable parking lot up there. These functions are often not obvious; at least, some people seem not to take them into account. Using telecommunications to transfer information was imputed to imply formalizing communication and information transfer, which in turn would force legal questions of ownership, of copyright, of standards of privacy, of access. That is an old list in telecommunications policy research which was emphasized several times.

There was for many people here a science policy question whether one should forecast and act so as to create change, or whether one is there to really understand it. That depends upon one's view of oneself as a researcher, along a continuum ranging from scholar to marketing manager to policy maker. This is less of a problem in some countries than others, depending, I think, on who appears to have the most vested interests, the deepest embedded investments in different services and different technologies. It was mentioned, for example, that in the UK VIEWDATA is seen as potientially beneficial to TV manufactures, as a new marketing opportunity. In the US I would expect VIEWDATA to be accused of reducing the market shares of commercial TV outlets. So you may have the same technology forcing different policy issues in different countries depending on industry structures.

There are other interesting differences. For example, in the satellite analysis area, for some reason the US and Canadian focus was on public services, while the European focus, at least in the paper presented here, was on business applications. I had to wonder, since both of these are for really untested demand, just what was the policy justification of doing the satellite research.

Another broad policy theme was the use of telecommunications for non-telecommunications purposes, for grander things: regional development and creating social change. However, I think there is some confusion as to whether telecommunications was a symptom of regional development - something that arises because of need for communications as regions develop - or something that creates regional development or perhaps these things work together. In

either case people discuss as a policy issue the problem of overcoming start-up problems, saying, "Well we have no plot of which way things will go, but we know there is a problem of getting telecommunications in place." The start-up issue seems to be a major one.

One of the two views on that was that you install a system and make it available and people will find a way to use it - a kind of technology push. And the other one was that you await market pressure, wait for a demand before you go ahead with installations. Those different points of views are a matter of experience and faith in what telecommunications can provide. They may also be a matter of how deep your pockets are in terms of what facilities can be provided. I think a good instance in the discussion was electronic funds transfer, in which interest had progressed from technology through marketing through economics and then to policy. The issue of what impact electronic funds transfer would have on the telecommunications network, probably the most serious telecommunications policy issue, came rather late and is still developing.

There was some talk, in papers and in discussion, of national goals on which policy choices might be made. There was some recognition that individual countries have their own problems and their own goals. I had a difficult time pinning down what those goals were. I heard very little discussion of just what a national policy goal in telecommunications is in any one of the countries, or what it would be like should such a thing be created. As a result, I think, the business of economic dominance emerged in the discussions - this business of people finding uses and these uses pushing the policy around, at least being stronger than the policy in terms of facilitating development of the different kinds of systems. It is interesting here that we did not discuss telecommunications policy as a reaction, a reaction to perceived imbalances, problems etc. I think most of us all the way through the discussion, talked about policy as some sort of instrumental activity to create something we want. Yet there is that other area that just was not very much discussed here, as it would be, for example, in a conference on regulation.

Interests in economic dominance brought out the question of <u>who loses</u> as being a major policy lynch pin or lever.

Another theme concerned the effects of the integration of telecommunications systems. This may come via standardization and may or may not be desirable. It may be undesirable from an economic point of view, while for technology suppliers it may be desirable in terms of putting services together so that they can be provided better. It may have social consequences in changing communication between regions, possibly between nations. Of course, as was mentioned, it also has the possibility of creating a rather fragile social network,

not just a fragile telecommunication system; it could become somewhat unglued, if there were problems with the telecommunications system, if someone pulled the plug. This would be much the same as the way in which very advanced water delivery systems and sewage systems make a city much more fragile and open to disaster than old style ones where there is a great deal of segmentation, even though the new ones offer certain benefits and efficiencies.

There is a newly identified theme (to which I would not yet ascribe fad status), the question of integration.

In many ways integration is the critical element for thinking about the future needs, services, industry structures, etc. Its ramification driven home today was that the different points of view of different sectors should be taken more explicitly into account in designing systems and investigating the way they develop. The issue of integration has many dimensions: economic, service, social and technical. It may even be a good organizing concept for dealing with broad policy problems: how are various demands aggregated? how integrated can systems be? what is the method for integrating resource allocation for the use of telecommunication systems? It is probably in this last area - although it hasn't been mentioned very much here - that some new serious attention and concern is being expressed in any sort of applications research in the United States. The best lesson that has been learned is that integrating resources, systems design and demand, are the three critical problems if one is going to do instrumental research or even if one wants to find out if things work very well.

METHODOLOGY: BERTIL THORNGREN

I would like to start with Mr. Goldstein's remark that somebody else is trying to do something in the system. In my view that is rather important. This "somebody else" may differ from country to country; it may also change over time. This makes it difficult to envisage sweeping generalizations about methods to be applied, because they may have to depend on these regional and timing differences.

There are clear risks if we do not take into account more of these "somebody else" types of effect. We may risk turning nails into screws, to try to make full use of the screwdriver.

In this area, when so often concentrating on new developments, there is also the danger of forgetting that if something you are studying goes up, something else may go down. This gets back to the "birth-death" model I referred to earlier in the symposium. The phenomenon is much more general when considering movement through a life-cycle: when something is increasing, somewhere else in the system something may be decreasing. The "somewhere else"

may be quite nearby, as when a straightforward process of substitution is at work, or it may be quite far away. Wherever it is, those, "somebodies" may wish to, and even be able to, affect outcomes.

I would, therefore, urge the value of broadening frameworks to take account of these dynamics. There may be forces acting from elsewhere, counteracting future movement, in what one is studying. I would agree with Michael Tyler that, very often in the social sciences, we borrow methods from the natural sciences a little too readily, thus not taking account of these types of problem.

Another general observation to be made is that many of the scientific methods we use are intended to reduce uncertainty one way or another. One type of uncertainty relates to which, of a given set of alternatives, may be the better or the best. In constructing the set there is a danger of cutting away a great deal of variety. Especially if one is forced to adopt a rather short-run perspective, a whole set of alternatives may be completely lost to view. There is a need for methods to counteract this danger, to increase the variety before one goes into assessment.

I have already mentioned the need to recognize the potentially active parts of the system. There is also the need to explore systems in terms of some more general socio-economic framework. The difference between these two needs was apparent in the studies presented here.

I would place a very high priority now on trying to achieve the broader framework which is needed for validation of such studies.

Should this be done specifically within the area of knowledge explored here? Or should it be a much more general kind of undertaking? I would urge the latter, because many of the most important things which will happen in our area will be initiated outside its conventional boundaries. For example, we have just heard that users themselves are taking initiatives, as in some of the computer applications. Very often in history new developments have entered from outside particular fields.

Even if we come from very different sectors and have difficulty in putting the pieces together, it is important to recognize the need for some integration of our activites. However, we must also keep in touch with our respective specialities in order to cover the broader area; they are valuable assets.

What I have experienced in this meeting has certainly been promising in that we have not been exposed to a very high variety of methods drawn from different sources. The sort of variety is not something to be expanded. I think it was Martin Elton's view

from the outset that some communication between us should continue. While we have had valuable glimpses of these different views, we do need to continue so as to go deeper into some and recombine them more than has been possible here.

I would be very glad to hear suggestions on ways and means of achieving ongoing communication between those of us here, which would draw on our connections with the rest of the world. There are many different possibilities; computer conferencing is one of them. Some kind of very loose, informal system might be a very worthwhile way to proceed.

METHODOLOGY: DAVID W. CONRATH

An appropriate starting point is a question that was passed to me five minutes ago, one very relevant to this meeting: given the constraints on the speaker, the probabilistic nature of the audience reaction and so on, what has information and communication theory and analysis taught us about the preparation of a ten minute talk on the subject? On pondering the question I realized the answer is, damn little.

I don't think this means that everything we have been doing over the past two years has had no impact. Though, when one reflects on the comments that were made by Ed Goldstein with respect to market needs and the problem of decisions which can't wait six years for a well defined study, one does wonder. Still, I do think that the basis for inputs into such decisions can be established. But this first requires a look at the question that Bertil Thorngren posed and which I, too, was thinking about: to what extent is an information exchange really taking place between communication researchers?

Is this meeting going to be a one-shot conference as so many are? And just because a meeting is held every year, or every other year, or upon demand, it does not mean that it is other than one-shot. The Institute of Management Sciences holds three or four conferences a year, and I fail to see any continuity between them. There has to be some form of coordinated exchange. One of the problems which I have seen in conferences like this is that communication is so frequently one-way. All of us want to say our piece and be heard. The unfortunate thing is that everybody sitting in the audience is figuring out, "What is it that I can say?" rather than listening to what is being said. There is no interaction; there is no possibility for integration.

Let me reflect on the comments made by Seymour Mandelbaum with respect to the community and on the fact that many of you are living in a seminary, a place which one associates with a monastery. When I visited last night I realized that you had created a community there, even though the concept of a monastery is of individual selves. The concept of community is anything but individual selves. A concept of exchange has, I think, to be incorporated in it. Communication and cooperation have to exist on several levels and it is very difficult to have it working on all levels simultaneously.

Putting this into the context of a community of communication researchers, first and foremost we need to cooperate among ourselves. This, by the way, may be the most difficult task to achieve. As I mentioned, it is so easy for us to speak and so difficult for us to listen; it is so easy for us to write and, believe it or not, so difficult for us to read. A researcher known to a number of you here faced a question asked by a lady at a cocktail party: "Have you read such and such?" His response was: "In full honesty, no. I haven't had time to read it. I've been busy writing." It was another symptom of the problem of a lot of output with little input.

Another point which arose when I was thinking of research and the problems of its communication is that it's so easy to write and so difficult to think. If I take a look at the literature in general, I wish there was a different reward mechanism, one which more clearly rewarded thought rather than output per se. Certainly our problems of reading would be greatly reduced if much of the material in print were removed, if we had some way of filtering out what was written with little thought. Another aspect of this problem is the great new computer system that is going to develop protocols to separate information for the U.S. Department of Defense. It would be really beautiful if one could somehow distinguish those pieces of input which are germane to a decision from those which are not. Maybe it can succeed; maybe defense or crisis situations are so well defined - though I doubt it - that one can predetermine what one wants to receive.

Not only must we communicate with ourselves, but it has become very obvious that one of the failures of research on the use of communications technology is that we have lost sight of the people in the market who have to make everyday decisions. I wish we had more representatives of them here. We are miserable in our communications with the users of our research. We may ponder, but we don't communicate. We seem to love esoteric discussions among ourselves, and we get uptight with the people who are impatient for answers. Of course the problems are not all one-way. However, those in the market listen a couple of times and they hear what the consider to be pure jiberish. After two or three times feedback mechanisms

cause them to say, "My God, I'm not going to listen to him again. He has no idea what my problems are." They are right because we continue to speak, not to listen. As a consequence we don't communicate. Without that communication, quite frankly, what we accomplish is of little value because it won't be used. What will happen, as Larry Day pointed out, is that there will be a push from the consumer with the market responding, a process which completely bypasses what we have to offer.

Here we are, in our monastery, making our community in a monastery, and having parties late at night, but nevertheless having nothing to do with what is going on in what Ed Goldstein refers to as the "real world."

We must also communicate with the technologists. and we appear to be doing better here. But it seems that all our research, and this includes all that I've heard up to today, is on existing technology. The challenge was thrown to us three days ago, "How can we do research on things as yet undeveloped?" I heard no response and this upset me, because the issues and the questions into which we can make useful input must deal with tomorrow's technology. The uses of today's technology are so far down the road that nothing we can do from a researcher's standpoint is going to make any real impact.

Well what does this imply? One thing it suggests is that we need a basis for exchange. To go back to the first point - communication among ourselves - we need some bases of standardization, of common data. I reflect back to what is required in engineering. Without standardization, technological integration is not feasible. So technologists set up committees that do achieve standards both within a nation and internationally. But behavioral scientists comment that the engineer's problem is easy. They know when a standard is good and when it isn't. Nonsense! What they know is that they have something which will work. Later on they may very well find that there are other things which work better.

Engineers are generally pragmatists. Their first criterion is: "Will it work and can we get agreement? Then at least we can get something accomplished if we use this standard." The questions asked so frequently among behavioral scientists are: "Isn't something being left out?" "Can't I find something better?" We are still searching for the Holy Grail. Probably we will be searching for it for another 500 years unless we start using other criteria, for example, "Will it work?"

The largest problem of all is our own egos. "I've got my little cell and I like it. I can grow in it. I can develop and I can get promoted in my research organization or increase my publications. Don't mess with it; I've got a nice thing going."

I think that we can do something to overcome this, and I'd like to make a specific suggestion for some ongoing cooperation as an example (however, I really hate to throw out suggestions now with the fear that the very act of making the suggestion will lead to it negation). There is a research program being developed in Sweden to examine a Broadband Video Network. There is research being planned in England on Viewdata, a different use of video technology but nevertheless one which allows some interaction. There is research going on in the States on interactive cable television, yet another use of video technology with different characteristics. It provides for the kind of feedback that Viewdata will have in the United Kingdom. It has broadband video characteristics similar to those the trial system will have in Sweden. No research methodology is universally applicable to all of these, but there are some similarities that can link the experience so that what is learned in one community and one country may have something to say to another community in another country. Without some common measures things will be virtually no different than they are at present. At least a small probability of making some useful comparisons is better than zero.

Back to the fear that a methodology may be non-comprehensive or less than ideal in some other way. There is nothing to prevent us from setting up standards that allow one to probe a few things in depth, and several in breadth. It is not that everyone should measure everything, or avoid using other measures. Some measures should be collected over all three studies so that at least there is a basis for exchange. What I mean by that is standardization by cooperation, by common data. It is not a universal answer; there are none. It permits innovation in the collection of data. It permits all sorts of opportunities for new ways of thinking about the problem. But it also provides some common bases, a common language for discussing common problems.

What are the relevant dimensions? We certainly need technological dimensions. In communications, if we cannot analyze our data in terms of implications for technology, we are wasting our time (unless our purpose is strictly human relations). We certainly need behavioral dimensions. We hear the term "needs research". Unless we are going to live in a future world of robots, needs are evidenced by human behavior and we have to tackle these dimensions directly. Thirdly, we also have to have - and this seems so frequently stated - dimensions of value, or performance. When we identify needs, we have to be able to determine whether in fact these needs are being met. Anecdotes are not sufficient.

Can we cooperate and establish a means for communicating among ourselves? Can it be done? Yes. There is one success story which at its beginning I never thought would succeed. This has taken place in an organization called, interesting enough, the International Communications Association. Some of you are familiar with it. It started out as a speech and rhetoric group. There is a group within it which is interested in Organizational Communication. They set up what they referred to as a committee for organizational communication audits. The purpose was to establish a nationwide data base, with common questionnaires, interview techniques, et cetera, so that there would be common data for work done throughout North America on the problem of organizational communication. The orientation was purely behavioral. There are no data there that can really be converted into technology, which was a disappointment to me. But the lesson to be learned is that cooperation did take place.

What has happened is that researchers take some of the dimensions, some of the questionnaires, some of the methods out of this common data base. They use these, elaborating them and adding to them as they see fit in the light of their own particular research interests. I think we can do this too.

This is a platform for the first stage. Perhaps what is needed now is a small group of researchers who have a vested interest in communications among themselves to commence such an undertaking.

APPENDIX A

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APPENDIX B

THE AUDIOCONFERENCE SESSION

Two North American authors were unable to be present at the symposium. Christopher Stockbridge (Bell Laboratories, Holmdel, NJ) and Gordon Thompson (Bell-Northern Research, Ottawa). At the suggestion of Dr. Stockbridge and with the kind assistance of the Bell System, which made available its experimental LLEICA (Long Lines Executive Intercompany Conferencing Arrangement) bridge for the purpose, the two authors presented their papers and joined in discussion of them from their own offices. About 12 individuals mainly absent co-authors of other symposium papers, also took part in this session from about eight other sites around the country.

The transmission was effected by using the regular telephone network to connect each participating site to the bridge. A collect call was placed from the bridge to the University of Bergamo (an obvious step, which was nearly overlooked, to avoid the problems of placing a transatlantic call from Italy while needing to avoid its cost falling on the Bell System).

The local office of the Italian PTT kindly made available an experimental conferencing terminal (with a single microphone and loudspeaker). In two tests earlier in the week the "feedback" problem was so severe that the session came close to being abandoned.

Fortunately we perservered. It was clear from subsequent remarks that those present had greatly appreciated Christopher Stockbridge's and Gordon Thompson's clarity of presentation, and that the quality of the teleconference had considerably exceeded expectations. (Note, however, that all present were aware that the first trial run had been very disappointing.)

It was unfortunate that, because it was necessary to operate in an "over-to-you" mode, the North American participants were deprived of the reinforcement (primarily laughter at intentional witticisms) offered, once they became comfortable, by those in Italy and that they missed the loud applause in the conference room at the end of the session.

NOTES BY ROBERT JOHANSEN, INSTITUTE FOR THE FUTURE

The Situation. At about 5:45 p.m. (Italian time) the teleconference began. About 50 people sat in rows confronting the small speaker box; our chairperson (Michael Tyler) sat at the table facing us with a telephone hand-set at his side. The teleconference began with a ring, a brief discussion on the handset, and three ear-piercing squeals from the not-so-small speaker. We were told that a small group with a North American chairperson were in New Jersey, with silent listeners in such spots as Los Angeles, Dayton, Washington,

and New York City. Two speech givers (Gordon Thompson and Chris Stockbridge) were ready and waiting in Ottawa and New Jersey respectively. Bell employees were in Chicago and Phoenix, serving as resource persons for Chris Stockbridge. Martin Elton in our Bergamo room paced anxiously about the hushed speaker cabinet, turning dials and assuring us that he didn't know quite what was about to happen.

The Event. The room was quiet, with curious observers leaning against the back wall. The North American chairperson (Murray Katz, Bell Laboratories) introduced his participants around the continent, but none was allowed to offer a greeting. Our chairperson in Bergamo mentioned the names of a few participants in our room. As Martin whispered to Michael, the box squealed again, but quieted to allow the North American chairman to introduce Dr. Stockbridge. The speech began, with Chris' sly humor dotting the presentation. He called up numbered slides and provided some of the informal history behind his printed paper, which he assumed everyone had read. Curiously, the Bergamo audience did not laugh; they started downward solemnly as if they did not know where to focus their eyes. The few notes of early laughter came in response to amplified squeals or quips within our room. It was as if we were listening in on Chris and their was no need for laughter in response to him.

Stockbridge spoke for only a few minutes before asking for comment from a colleague in Chicago; then he asked another from Phoenix to join in. His skill in involving others provided a pleasing sort of diversity. As Stockbridge *et al* go over their ten minute time limit, the North American chairman interrupts to ask if anyone has any questions. After waiting about 5 seconds (probably too brief even for a face-to-face meeting), he then asks for questions from Bergamo.

The first questioner (sensitively, I think) shares a little about issues we have been discussing here before asking a general - but challenging - question. Stockbridge refers to the questioner, whom he knows, by name in orchestrating a response from his colleagues. (The people in Bergamo laugh as he refers to her by name. It is as if we are asking: how does he know she is here?) It's easier to ask simple questions in this structure, especially since we must write them out and pass them forward. However, Chris responds to the short questions with a long answer and the time allowed is quickly gone.

The second speech is introduced from North America amid a rumble and another speaker squeal. Gordon Thompson gives an animated speech and the Bergamo group gradually seems more closely linked with the other end of that line; the laughter comes easier and it seems as though we are learning a sense of contact between groups - or at least with Gordon. (Martin whispers instructions to Michael again.

It is clear that we are still involved in something of an event.) The Bergamo participants continue to stare at the floor between laughs. I am spared the awkwardness by note-taking.

As Gordon finishes, an anomymous questioner speaks forth but we cannot understand. (Speaker identification is still a problem.) Someone else asks a question which challenges Gordon's thesis. Gordon re-states his argument. Conflict is not easy here; if disagreements occur it's easier to whisper them unnoticed or save it for the hallway.

The format or the degree of interaction does not differ radically from the face-to-face sessions which have preceded it. If technical limitations were eased within easily believable limits, more interaction would have been possible. The North American leaders facilitated some interaction and could have done even more. Most of the participants seemed to leave at least somewhat satisfied. The papers had been discussed, typically if not profoundly. Some sense of contact between locations occurred, however crudely. As Michael Tyler commented, things went "pretty well for an improvisation". The teleconference ended, by prearrangement, an hour after it had begun.

NOTES BY JOHN CAREY, ALTERNATE MEDIA CENTER

1. I was one of the last people put into the North American bridge. As a result, I was called 15 minutes later than the guideline time - and I was a little anxious.

2. The number system for getting the floor worked very well. With your assigned number, you could indicate a desire to ask a question or make a comment without interrupting the current speaker.

3. Introducing me to each member of the North American bridge before making the trans-atlantic bridge was very helpful - I felt more comfortable. It did make me feel that I was part of a "North American" group who would be talking to a "European" group, but I don't think this was bad.

4. The quality of the transmission was excellent. I heard everything with absolute clarity.

5. The structure, i.e., chairman in North America, speakers, chairman in Italy, seemed to work well. As a participant, I understood what was happening and felt the meeting was under control.

6. I was a little concerned about noise in my environment. Trucks were passing by outside. I covered the microphone on my phone but didn't know what was leaking through. Apparently this was not a problem but I didn't know that at the time.

7. The length of each speaker's talk seemed just about right - I was comfortable and quite interested. In addition, it probably helped that they were talking about their papers rather than delivering them. This provided a more informal presentation of the ideas - and a different perspective from the formal paper. Also, both speakers seemed "at home" on the phone - a friendly, relaxed style.

8. After the first paper, I had a question but didn't ask it. I suppose I was a little shy and didn't want to jump in first. Also, knowing that time was limited, I didn't think my question was so important. However, after the second paper I did ask a question. By this time the ice was broken and I realized that my question was likely to be as useful as anyone else's. In asking it I did not 'follow up' as I would liked to have done. There were two reasons: A. I was conscious of time and didn't want to hog the floor, and B. I wasn't sure if my phone was still punched up so that I could talk without calling out my number again. I don't know that the above "psychological" concerns are particular to a teleconference. They seem to operate in many large meetings.

9. After the transatlantic bridge was broken, the North American group stayed on for 10-15 minutes. Here, the exchanges seemed more relaxed and free. A back and forth exchange developed between one questioner and one of the speakers, and people seemed more willing to jump in. There are probably a few reasons for this: no particular time constraints existed; by now, we knew each other better; the formal teleconference was over and it felt like "chit-chat" after a meeting.

10. I would have liked to have heard each Bergamo questioner personally asking his or her question - but the system used, i.e., the chairman reading questions, was not a major problem. In the same way, the 30 second delay caused by their switching from handset to speaker was a minor limitation. I would have preferred no delay, but wasn't bothered by a short one.

11. Overall, I have a very positive feeling about the teleconference. I feel it "worked" and that it was useful to me.

APPENDIX C

EVALUATION

A questionnaire survey was conducted on the last day of the symposium. Since many participants were rushing for planes the response rate was only 50%.

This appendix extracts some of the results.

Evaluation of the symposium as a whole. Respondents could check "Very Good", "Good", "Fair", "Poor". These were assigned scores of 10, 7 1/2, 5, 2 1/2, and 0, respectively. The average ratings by the different national groups were: North Americans 8 1/2, British 8 1/4, other Europeans 8 3/4.

Social and administrative arrangements. On similar scales administrative arrangements rated just above 8 1/2, social arrangements 9 1/4.

Balance of time for presentation and discussion. Around one-third considered the balance of time allocation was about right. About one-quarter would have preferred more time for presentation. (Authors - except for four invited speakers - were allowed 10 minutes to summarize their major points. Almost all papers were circulated in advance.) Approaching half would have preferred more time for discussion. Those who would have liked more time for presentation or discussion would have preferred fewer papers to a longer meeting. However.....

Individual contributions. To provide feedback on the selection process respondents were asked to rank the five most valuable presentations and the five most valuable oral presentations. This shows that, if the number of papers had been halved, about one-third of the most valuable participants (according to this criterion) would have been eliminated. (The actual rankings are being treated as confidential to the Organizing Committee.)

A repeat. All respondents felt there should be a follow-up conference. The majority (about 80%) considered it should be two years, rather than one year, later.

APPENDIX D

A SUBSEQUENT CONTRIBUTION TO THE DISCUSSION

In reaction to draft summaries of the discussion sessions Herb Ohlman provided some extension of his remarks together with bibliographic references. This additional material is incorporated here.

Summary of Discussion in Section Two.

Amplification of Mr. Ohlman's remarks in penultimate paragraph. An example is provided by the Satellite Instructional Television Experiment (SITE) which suddenly propelled isolated Indian villages into the space age (1,2). However, it was clear from the beginning that NASA would only provide its advanced communications satellite ATS-6, for a period of one year. The experiment certainly stimulated, informed, and educated thousands of villagers during this period, but what a let-down it must have been when they confronted the blank television screens the day after the satellite was pulled away! Lessons to be learned from SITE and similar demonstrations, pilot projects, and other donor-aggrandizing innovations are vital if we are to change our attitudes and behavior towards the least developed countries and their inhabitants. Development problems should not be tackled piecemeal, but rather on an intersectoral basis, with continuing support over long periods, large amounts of local participation, and independent evaluation (3).

1. Singh, J.P. and Jamison, D.T. "The Satellite Instructional Television Experiment in India: a case history", Center for Development Technology, Communications Group, Washington University (St. Louis), July 1973.

2. Maddox, B. "India's schoolroom in the sky", New Scientist Aug. 7, 1975, pp 332-34.

3. Vaidyanathan, A. "India's satellite" (letter in response to Maddox), New Scientist, Aug. 21, 1975.

Summary of discussion in Section Four.

Amplification of Mr. Ohlman's remarks in second paragraph. The international language movement appears to be reviving. Charles K. Bliss' "Semantography" has at last found its application as a medium of communication for physically handicapped nonverbal children in Ontario (1), and a nonprofit corporation, the Blissymbolics Communication Foundation (2), has been established to promote its use. More recently, another pictogram-based language has been developed in Japan by Yukio Ota (3). The American Sign Language long used by the deaf has been taught to chimpanzees who not only communicate with their trainers but with each other (4,5).

Corresponding anti-Babel trends can be detected in recent developments in computer networks. EURONET, the European Community's planned network for scientific, technical, social, and economic information, has a multilingual program which will provide for automatic translation of scientific and technical texts drafted in natural languages (6). They also will implement a standardized set of search commands which users can employ with any of a hundred diverse data bases. (7).

1. Ontario Crippled Children's Centre, 350 Rumsey Road, Toronto, Canada.

2. 862 Eglinton Avenue East, Toronto, Canada.

3. 2-15-15 Yakumo, Meguro-Ku, Tokyo 152

4. Moores, D.F. "Nonvocal systems of verbal behavior", in Schiefelbusch, R.L. and Lloyd, L.L. "Language Perspectives -- Acquisition, Retardation, and Intervention", University Park Press (Baltimore), pages 377-417.

5. Chedd, G. "Educating Nim", New Scientist, October 23, 1975.

6. Euronet News, issue no. 7, July 1977, page 6; issue no. 8, October 1977, page 1.

7. Euronet News, issue no. 8, October 1977, page 3.

Summary of Discussion in Section Five

Amplification of Mr. Ohlman's remarks in second paragraph.* CB is developing under a new group psychology. In the future, CB and mobile-telephone markets may merge, providing for both mass and individual voice-communications needs within the same system (1).

1. "'CB will skyrocket' claim", Electronics Weekly, Nov. 16, 1977.

Summary of Discussion in Section Six

Amplification of Mr. Ohlman's remarks in third paragraph of third page. The distinction between narrowband and broadband communications is more of interest to systems engineers than to users. Unless they are large users, who must deal with time-cost tradeoffs, most users are unaware of the type of channel over which they are communicating. Much more important to them is the distinction between "mass" and "class" communications systems. For example, Life magazine may have vanished because its market was based upon the voracious appetite for pictures by the general public, which became better satisfied by television. However, specialist magazines giving emphasis to hobbies, sports, consumerism, entertainment, etc. have flourished.

*Session chaired by Percy Tannenbaum

In the future, the "class" extensions of television (cable, interactive games, teletext, etc.) will attack and likely displace many of these lucrative information markets.

It is a truism that new systems cannot flourish without good market research and adequate promotion. It is doubtful if such potentially dramatic and far-reaching innovations as telephone conferencing have been adequately researched and promoted, tacked on as they are to communication networks never designed for their switching and fidelity requirements.